This is a reproduction of a library book that was digitized by Google as part of an ongoing effort to preserve the information in books and make it universally accessible.

Google™ books

https://books.google.com

Soc. 1731 d. 60/1863-64

Soc. 1731 d. 60/1863-64

SESSIONAL PAPERS

OF THE

ROYAL INSTITUTE OF BRITISH ARCHITECTS,

Incorporated in the Seventh Year of William IV.

PATRONESS . . HER MOST GRACIOUS MAJESTY THE QUEEN.
PATRON . . . HIS ROYAL HIGHNESS THE PRINCE OF WALES.

COUNCIL.

President—THOMAS L. DONALDSON.

Vice-Presidents—A. ASHPITEL, EWAN CHRISTIAN and OWEN JONES.

Honorary Secretaries—JOHN P. SEDDON and CHAS. FORSTER HAYWARD.

Ordinary Members of Council.

W. BURGES.
G. SOMERS CLARKE.
B. FERREY.
J. H. HAKEWILL.
O. HANSARD.
H. JONES.
T. H. LEWIS.
G. J. J. MAIR.
W. PAPWORTH.
J. L. PEARSON.

Honorary Secretary for Foreign Correspondence—CHARLES CHARNOCK NELSON.

Auditors—CHARLES FOWLER, Jun., Fellow, and R. NORMAN SHAW, Associate.

Treasurer & Banker—SIR W. R. FARQUHAR, BART., 16, St. James's Street.

Honorary Solicitor—F. OUVRY, 12, Queen Anne Street, Cavendish Square.

Librarian—FRANCIS T. DOLLMAN, 9, Conduit Street, Hanover Square.

LONDON:
PUBLISHED AT THE ROOMS OF THE INSTITUTE, 9, CONDUIT STREET, HANOVER SQUARE. W.
AND SOLD BY
J. H. & JAMES PARKER, 377, STRAND, AND OXFORD.

1863.

[ENTERED AT STATIONERS' HALL.]

The Right of Reproduction and Translation is reserved by the Council.

LONDON:
J. DAVY AND SONS, PRINTERS. 137, LONG ACRE.

ANNOUNCEMENTS AND OCCASIONAL PAPERS.

The President said it was his duty to announce that the Committee constituted for the purpose of providing the Portrait of their late valued President, Mr. Cockerell, had that day concluded their duties, and they had hung up that picture in the room in token of the affectionate regard in which they held the memory of that great man. It was presented to the Institute; and he was sure they would be gratified to possess that record of one whom they were all called upon to respect and admire.

Mr. C. F. Hayward, Hon. Sec. in announcing the donations to the Institute received during the recess, said, that one donation in particular was very important, and called for some special remark. It was almost a melancholy duty to announce it, because the donation resulted from the very severe affliction which had befallen one of their former Fellows—Mr. J. M. Lockyer—for whom they all felt considerable personal sympathy. This gentleman had been one of the most valuable members of the Institute, but as they were probably aware he had become totally blind within the last two or three years, which of course had prevented him from carrying on his professional pursuits, thus closing a bright career of practical usefulness in the literary and antiquarian, as well as in the artistic branches of his profession. Mr. Lockyer had felt compelled to resign his position in this Institute, but it had not prevented him from feeling the warmest interest in all its proceedings, and in everything connected with the interests of the profession at large. In token thereof, and in token also of his gratitude to the Institute for the benefits he had derived therefrom, he had presented them with a valuable donation—in fact with *two* donations. He named them as two becausethey were distinct in their character and deserved to be mentioned separately. One was the handsome case which they saw before them, containing a number of drawers, in which were a variety of casts in plaster, which Mr. Lockyer had collected previous to his being afflicted with total blindness. He believed the specimens numbered as many as 60, and though he (Mr. Hayward) had not yet had the pleasure of going through them himself, he had the satisfaction to announce that Mr. Digby Wyatt had carefully inspected them, and that gentleman he hoped would read a paper before the Institute, one evening, upon them. Therefore as they might hope to have these casts brought before them in a way which would enable them to appreciate this gift as it deserved—for they were not to be understood by a mere glance—he would merely add that there were casts of Roman Consular diptychs, Mediæval triptychs, ivories, jewellery, book covers, and a number of rare and curious specimens of carving and metalwork, which he believed were not easily to be found elsewhere. The second donation, Mr. Lockyer had given, was a large portfolio of his own drawings, and all those who know anything of these were aware, and gentlemen who now examined them would see, that they were some of the most beautiful and pains-taking works that could be produced. These drawings Mr. Lockyer had carefully arranged, as he wished them to be kept undisturbed in the portfolio hereafter, a wish which he was sure would be respected and carried out by those who examined them. The drawings were arranged under a variety of heads, similar to the plan adopted in the Dictionary of the Architectural Publication Society, and several of these drawings he believed had already appeared in that important work. Altogether they formed a most valuable series of original architectural studies, and one for which they were very much indebted to their friend.

From Mr. Lockyer himself he had to say that he had presented these donations with a three-fold view. In the first place he wished them to be in the possession of the Institute, because in his present condition he unhappily could make no use of them, and he felt that they would be well taken care of and might be useful to some of the members. In the second place Mr. Lockyer wished these drawings to be a nucleus of a large collection of similar drawings, together with works of art, so as to make the

Institute something beyond what it had been or what it was, and more what it should be, viz. a *museum* and collection of every kind of work of art connected with their profession. Mr. Lockyer's ideas were as enlarged as those of any member in the room—large as he (Mr. Hayward) knew the views of many to be—with regard to the extension of the scope of the Institute as far as possible, towards forming a museum upon their own premises, as well as providing a reading room in addition to the library, and a variety of other objects which at present they only hoped for, but which Mr. Lockyer, with no eyes for the outer world, seemed to see in his mind's eye almost accomplished. He (Mr. Hayward) hoped they were moving in the right direction, and these valuable donations might be regarded as another step that way. In the third place Mr. Lockyer wished these donations to be used particularly as examples for students, and it was his special desire that students coming to this Institute should find within its walls something which they could not find elsewhere, particularly original architectural drawings of cotemporary men—drawings not so ancient as to be of mere historical or antiquarian interest—but such as would serve the purpose of practical instruction and encouragement to the younger members of the profession, and with regard to these drawings especially, Mr. Lockyer had presented them with that view, and it was by that gentleman's special wish he (Mr. Hayward) had troubled them with these few remarks.

MR. GEORGE GILBERT SCOTT, Fellow, thought the members ought to present a special vote of thanks for such a donation as this. Being of an unusual class, the thanks of the Institute ought to be conveyed in the most distinct terms, accompanied by an expression of heartfelt sympathy with Mr. Lockyer in the affliction which had come upon him, occasioned, he believed, entirely by over-assiduity in the pursuit of his art.

THE PRESIDENT, T. L. DONALDSON, said no doubt, as Mr. Scott had stated, over devotion to his art had occasioned this affliction to Mr. Lockyer, a man of the most refined taste and highly accomplished in every branch of science, literature and art connected with architecture. In his present helpless bodily condition, with a mind as vigorous as ever, he thought it most desirable that they should do something special to mark their appreciation of Mr. Lockyer's character, as well as of the donation he had presented. He therefore suggested that it should be referred to the Council, to consider and report to another meeting what proper mark of respect and affection should be shewn to their friend and late Fellow, in consequence of his valuable donation. Perhaps it would be a fitting compliment if they elected him a Fellow for life, without contribution.

The following is a List of the Drawings presented by Mr. Lockyer :—Palaces, Houses and Fountains, 21; Church, 9; Church Decoration, 11; Pulpit, 5; Tomb, 2; Door, 9; Tower, 6; Mosaics, 3; Woodwork, 2; Metalwork—Candelabrum, 5; Roman Remains, 13; Pompeian Remains, 7; Cloisters of Monreale, 1; Falls of Terni, 1; also, a Drawing for Insised and Inlaid Mural Tablet.

The exact number of Casts is 59.

Mr. C. F. Hayward wished to make one or two observations with regard to the publication of the Transactions of the Institute. The Council had arranged for their publication in the ensuing session the same as in the last, that plan having answered, and more than answered, their expectations. The volume for the last session had been produced in the form now before them, and arrangements had been made whereby they had a number of copies in stock beyond those required to be issued to the members, and these would be disposed of in exactly the same way as their Transactions used to be in former years, that is bound in a volume with the stamp of the Institute thereon, so that a future new member wishing for an early a copy of the Transactions could have it, thus completing the Series from a period before he was admitted. In order that their Transactions might not be confined to members only, they were now sold, if the public chose to purchase them, through their publishers, Messrs. J. H. and Jas. Parker. The several parts for the last session had been bound in the form they now saw, and arrangements had been made with the printers, whereby if members wished to have their parts bound with the Institute stamp upon the cover, they could have it done at a small cost: although the copies hereafter issued would not be sold in parts—only in bound volumes as before stated. The price of the present volume to non-members would be one guinea, and to members who wished for one additional copy half a guinea, binding included. In considering the whole question of their Publications thoroughly and completely, they had searched over all their stores, and had produced therefrom a large number of copies of Transactions of early years, and amongst them were some interesting volumes which it was desirable members should know were to be had.* They extended over a number of years, but more particularly he would draw attention to the volume considered so interesting—that for 1842, published by Longmans, containing the valuable essay by Professor Willis on Mediæval Vaulting, and other papers, including one by their present President on Greek Color Decoration, all accompanied by a number of important illustrations. Of this volume (for 1842) there were happily a goodly number of spare copies, which with others would, by the permission of the Council, be sold to members; but as there were only a few copies of certain years, early application for them should be made to the Librarian by those who wished to complete their series. Hitherto they had been in the habit of giving these spare copies away, and the consequence was that gentlemen who were aware of that fact, and spoke first, got them, and those who were not aware of it did not. All members were now placed on an equal footing in this respect, and these back volumes would be sold till the whole stock was worked up. He trusted this arrangement would give satisfaction to the members at large.

The regulations this year for Students, with regard to the Library, were such as he was afraid would be considered as a step backwards, which he heartily regretted, as he had himself urged the Council (on behalf of the students) to proceed in the direction they had done in this matter, and he felt the Council had not been properly supported. At the commencement of the last session they made arrangements to have the Library opened *every evening*, instead of only on three evenings in the week, as it used to be. They had a special Sub-librarian to attend, but he was sorry to say the additional facilities provided were not taken advantage of. The Council went so far as to establish a class called a class of temporary students, to induce gentlemen to make use of the Library for the special purpose of studying for the Voluntary Examinations. Those who availed themselves of these advantages were so few, and came so seldom, that the Council did not think themselves justified in carrying out the special arrangements for the ensuing year. Therefore the Sub-librarian was no longer an officer of theirs, and they were obliged to go back to the old system of having the Library opened only three evenings in the week: and it depended upon the students themselves whether a return should be made to the system which was inaugurated last year. He might say, with regard to the Voluntary Examination, the Council had given special permission, if there should be an influx of temporary students at the end of the year, for the Hon. Secretaries to make special arrangements for the use of the Library, and for their accommodation generally, therefore he hoped it would never be said that their Library was not available to architectural students, if they choose to make use of it.

---

* These will be found Catalogued in the Notice Paper.

ANNOUNCEMENTS AND OCCASIONAL PAPERS.

The **President**, T. L. **Donaldson**, made the following communications in reference to the decease of the late Mr. J. B. Bunning, Fellow, and of Mr. Wm. Cubitt, M.P.:—

It is my painful duty to announce another loss, which the profession has had in the death of Mr. J. B. Bunning, Fellow, Architect of the City of London, and which occurred on Monday, the 2nd instant. I was not aware, when I addressed you at our last meeting, of his decease on that very day. Mr. Bunning was a man of no ordinary character. Not content with the mere routine of official duty (which, however, he carried out zealously and with stern integrity), he had higher aims, and with an earnestness beyond all praise he directed his efforts to give to his public buildings for the City the stamp of a monumental character, worthy of the corporate body whom he represented. The Coal Exchange, which in less skilful hands might have been a commonplace mart, he arranged in a manner at once noble and convenient. The central circular hall, 60 feet in diameter and crowned by a glass dome of bold construction, and rising to the height of above 70 feet from the floor, is a grand feature, recalling the sentiment of an antique Roman building. And we must all be grateful to him for having induced the Committee to expend a considerable sum to retain and render accessible the precious ancient Roman thermal hypocaust, which lies at a great depth below the foundation of the main structure itself. The New Cattle Market is laid out with a largeness of idea and embellished with admirable groupings and details, rising above the ordinary arrangements of buildings of metropolitan usefulness. In fact, in all his works, which I need not here enumerate, his study was to unite convenience and beauty, the old Vitruvian precept, and not to be satisfied with mere commonplace ideas. His artistic feeling was evidenced in his successful efforts to induce the Corporation to promote the arts by ordering periodically statues and groups to adorn the Mansion House, and his strenuous determination to secure the services of the leading sculptors of the day, unswayed by motives of partiality or jobbery on the part of others. In fact, he was the type of a high-minded incorruptible public officer, fulfilling his duties from the purest motives, uninfluenced by any other desire than for the public interests. With a firm independence he acted upon his own honesty of purpose, strengthened by a sound judgment acquired by a long experience of active professional life. His last crowning work was the striking and effective temporary embellishments of London Bridge, and the decorations of the public buildings on the route of the cortège, which welcomed the entrance of the Princess Alexandra of Denmark to this metropolis. His health broke down under the exertions consequent upon the realization of these ideas, and he was therefore compelled to tender the resignation of his appointment; but the City authorities declined the acceptance of his retirement, and marked the sense of his unswerving rectitude, his high motives, and valuable services, which had won their confidence, by a resolution expressive of their respect and esteem, and he retained his appointment and its emoluments up to the time of his decease.

I trust that I may be permitted to allude also to the death of another public man, who has recently passed away, and who followed a branch of business intimately connected with our profession. I refer to the late William Cubitt, M.P., and twice Lord Mayor of London. He and his brother Thomas (deceased some few years since) rose from the most unpretending beginning of life to the highest eminence, as builders, and acquired commensurate fortunes, the fruits of their own industry, their intelligence and spirit of enterprise. In various parts of the Metropolis and suburbs they erected residences of a class superior to any that preceded them, for combination of domestic conveniences and soundness of construction; so that a house built by the Cubitts became proverbial as one, that was substantial and free from the dilapidations and discomforts of ordinary dwellings. The two brothers* entered upon a grand scale of business, uniting the various building trades under their own control, availing themselves of the mechanical appliances of recent discoveries, choosing the best markets for materials, and manufacturing many themselves, so as to be independent in their operations. They were thus enabled to undertake the largest works, and to carry them out with a rapidity and perfection, which secured a high reputation for their firm. Nor were they less careful of their artizans, whose interests, improvement and comfort were equally studied in every possible way upon their own premises. Thomas Cubitt, as you know, created a princely quarter of the town in Pimlico, upon the estate of the Marquis of Westminster, where some of us remember low and marshy fields often covered by the waters of the high tides of the Thames. He raised the level of the surface, laid out noble lines of streets, constructed public sewers at an enormous cost, and erected houses of a palatial character. Had his councils been listened to, and if the Government had acted upon the enlarged views of metropolitan distribution, which he often discussed with me, tracts of the suburbs, then uncovered by houses, might have been traversed by lines of thoroughfares, affording direct communication to every part of the metropolis. Mr. Thomas Cubitt concentrated his energies for about a quarter of a century or more in completing his vast enterprise at Pimlico, while his brother William and his firm carried out with like energy projects of equal extent in the Isle of Dogs and elsewhere. Thomas possessed the confidence of the Queen and the late Prince Consort, and executed for them considerable works. Without the assumption, that might almost have been pardoned in men of such high mark and success, simple and unostentatious, with the largest experience, and most varied dealings with men and things, with the skill to avail themselves of every improvement, and with a rare foresight which could see results as by instinct; it is not to be wondered at, that both should have won the esteem and respect of all classes, and that the late Wm. Cubitt should have been called for two successive years to fill the civic chair, and to preside over the interests and protect the privileges of the first city of the commercial world.

I hope you will not think these few words from this chair unbecoming, or more than due to the representative men of that intelligent and influential class, the Builders, with whom, from the very nature of our respective pursuits, we are, as Architects, necessarily and immediately brought in contact.

The **President** said he had to announce that in consequence of the munificent donations from Mr. Lockyer, jun., presented at the last meeting, he considered it his duty, not merely as an individual, but as President of the Institute, to wait upon that gentleman. It was a most touching and interesting interview, to see one in whom they had had the greatest hopes—a man of warm feeling and imagination—full of natural fire and vigour, and love of his profession—blind, sitting by his fireside; alone, but sustained and cheerful in the contemplation of what he had seen of beauty in architecture, and in his own studies, in which he had been so eminent. He conveyed to Mr. Lockyer the expression of the sympathy, which they all felt in his misfortune, and their gratitude for the magnificent collection of casts contained in the case before them, and for the portfolio enriched with those most exquisite drawings. He also stated to Mr. Lockyer, that it had been referred to the Council to consider the most appropriate way to mark their estimation of his talents, personal character, and kind feeling to the Institute. He was now happy to state that the Council, having taken the subject into consideration, had come to a resolution to recommend to the members, that Mr. Lockyer should be elected a Fellow for life, without contribution (loud applause). He had only to add, that the next meeting would be made special for that purpose.

---

* A third and surviving brother, Mr. Lewis Cubitt, is an architect in considerable practice, and has executed some remarkable works, among which may be specially named the Great Northern Railway Terminus, King's Cross.

The President then called attention to a miniature of the late Mr. Cockerell, painted by Sir William Newton, whom he was happy to see present, and through whose kindness they were gratified with so striking a portraiture of their lamented friend. [At a subsequent period of the meeting, a vote of thanks was passed to Sir William Newton, for this considerate act of kindness to the members.]

Mr. CHARLES FOWLER, jun., wished, before the reading of the paper, to ask whether the Council had taken any steps, or contemplated doing so, with reference to the railway viaduct about to be carried across Ludgate-hill, which would obstruct the view of St. Paul's,—that magnificent monument of architecture, of which they had before them an exquisite drawing by the late Mr. Cockerell?

The PRESIDENT replied, that the Council had taken no steps in the matter, nor had they contemplated doing so. Mr. Fowler had no doubt seen the magnificent design for the bridge on Ludgate-hill, which had appeared. At present the subject was not before the Council in any shape: but if Mr. Fowler sent a communication to the Council on the subject he could promise that every attention should be paid to it.

CHRONOLOGICAL LIST OF DESIGNS AND DRAWINGS BY THE LATE CHARLES ROBERT COCKERELL, ESQ., R.A.,

Selected to be Exhibited at the Royal Institute of British Architects, November, 1863.

7	Designs made in Italy for a Palace for the Duke of Wellington. Plans and Elevations.	1816
3	Bristol Philosophic Institution. Plans, Sections, and Views	1818
	General view of the works of Sir Christopher Wren	1818
3	Harrow School, Plan and Elevations, New Wing, Speech-room, &c.	1818-1820
1	View of the Roman Forum, restored	1819
	Mansion at Oakley Park, for the late Hon. Robert Clive. Plans, Elevations, and Details	1819-1824
1	View of the Parthenon and Acropolis, restored	1820
5	Hanover Chapel, Regent Street. Plans, Elevations, Views, and Details	1821-1824
4	St. David's College, Llampeter, Cardiganshire. Plans, Elevations, and Views	1821-1827
4	Chapel and Mausoleum at Bowood, erected for Lord Lansdowne	1822
17	Mansion for Mr. J. L. Naper, at Lough Crew, Ireland. Plans, Elevations, Views, and Details	1822-1829
5	Additions to the Grange, in Hampshire, New Dining Room, &c. for	1823-1825
	House at Dery Ormond, for John Jones, Esq.	1824
1	View of Athens, restored. (A companion to that of the Roman Forum)	1824
	National Monument on the Calton Hill, Edinburgh. This was designed on the model of the Parthenon, at Athens, and of the same size; the porticos and vestibules were adapted to the reception of commemorative statues, and the interior to the purposes of a church	1825
4	University College, Gower Street. Competition design	1826
34	Mansion for Mr. Farquharson, at Langton, Dorsetshire. Plans, Sections, Elevations, and Details	1827-1833
7	The Duke of York's Column. Competition design	1829
1	New Street from Pall Mall (National Gallery, Trafalgar Square) to St. Martin's Lane	1831
4	Westminster Life and British Fire Office, in the Strand	1831-1832
1	Theatre of Pompeii, restored, as it may have appeared between A.D. 63 and 79	1832
5	Design for a Mansion in Scotland, for Mr. Bruce, (not executed). Plans and Elevations	1833
5	New Houses of Parliament. Competition design	1835
	Dividend Pay and Warrant Offices, and Accountants' Drawing Office, Bank of England; this was pulled down for the New Drawing Office, also erected by Mr. Cockerell	1835
1	Falkland Palace, (not executed.)	1835
9	Reform Club, Pall Mall. Competition design	1837
4	London and Westminster Bank, erected under the joint superintendence of Mr. Cockerell and Mr. Tite	1837-1839
3	Chapel at Killerton, Devonshire, for Sir Tho. Dyke Ackland, Bart.	1837-1840

1	Harrow School Chapel	1838
1	Tribute to the Memory of Sir Christopher Wren	1838
	Model of a Dome for a Conservatory for Mr. Battersby, at Stoke Park, near Bristol (not executed); the form of construction was suggested by the Gothic dome of the Abbot's Kitchen, at Durham	1839
11	Royal Exchange. Competition design	1840
6	Sun Fire Office. The building was begun according to the design No. 1, afterwards the City required the Threadneedle Street front to be set back to widen the street, and the angle to be taken off	1840
14	Taylor and Randolph Galleries and Library at Oxford. The 7 drawings on strainers were those sent in competition. Other studies and drawings of the building executed	1841-1846
5	Branch Bank of England at Manchester; Studies; and Elevation as erected	1844
1	Branch Bank of England at Bristol, Elevation as erected	1844
11	Carlton Club, Pall Mall. Competition design	1844
	Branch Bank of England at Plymouth	1844
	Branch Bank of England at Liverpool	1845
1	The Sculptured Pediment of St. George's Hall. Mr. H. L. Elmes, the Architect of St. George's Hall at Liverpool, who sought occasional advice from Mr. Cockerell in carrying out his great work, saw this drawing, and recommended it to the Corporation, for the South Portico of the Hall; it was executed as shewn in this lithographed view	1846
	Bank Chambers, Liverpool	1846
11	Fitzwilliam Museum, Cambridge; drawings of the finishings of the Central Hall, after the death of Mr. Basevi	1846-1847
1	The Professor's Dream; a Synopsis of the principal architectural monuments of Ancient and Modern Times	1849
6	New Drawing Office, Bank of England	1849
18	Designs for the Interior of St. George's Hall, at Liverpool, finished by Mr. Cockerell, after the death of Mr. Elmes in 1847. Views of the Hall, Organ, &c.	1851-1854
6	Liverpool and London Insurance Buildings at Liverpool	1855-1858
	Designs for Monument proposed to be erected in Guildhall to the Duke of Wellington	1855
1	Study of the Mausoleum at Halicarnassus	1858
2	Sketches, Theory of the Horizontality of Greek Architecture as contrasted with the Perpendicularity of Gothic Architecture.	
5	House for Mr. Leonard.	
2	Proposed Granite Pedestal for the Warwick Vase, Cambridge.	
1	Restoration of Pompeian House.	
2	Restoration of a Greek Temple, showing the hyperthyrum.	
1	Approaches to London Bridge (sketched design).	
1	Basilica at Vicenza by Palladio; one of several hundred drawings for lectures at the Royal Academy during the years 1840-1857.	
28	Views in Greece.	
33	Drawings of Antique Sculpture.	
	Etching of the Pediment of the Temple at Ægina.	

40 Designs in competition in 1830, for the Cambridge University Library and Museum, with Mr. Wilkins, Mr. Decimus Burton, and Messrs. Rickman and Hutchinson. This competition partially failed; Mr. Cockerell's designs were highly approved, but Messrs. Rickman and Hutchinson's were chosen in consequence of Mr. C.'s departure from the programme of the Syndicate, who required that the centre of the ground in front, between the Senate House and the fence next to King's College, should fix the axis of the building. Mr. C. made the design, No. 1, partly on that principle; but in the more finished design, No. 2, he took advantage of the width of the site, and filled the ground so as to get the quadrangle nearly 100 ft. square, instead of 100 ft. by 60 ft. as the programme would have made it. This gave rise to many criticisms on Mr. Cockerell's and Mr. Rickman's designs, and a number of pamphlets (which are to be found in the library of the Institute) were issued on the comparative merits of the two, with others by Mr. Wilkins: and, finally, in 1835, the same parties were again invited to compete, and Mr. C. offered his third design, which was chosen, and the North Wing was proceeded with. In the interval of the two competitions the Theatre shewn in designs Nos. 1 and 2, had been executed in another part of the University, so that it was not required in the third design.

8 Sketches of Design made at the desire of the late Prince Consort, for the proposed Galleries and Museum at South Kensington.

ANNOUNCEMENTS AND OCCASIONAL PAPERS.

COPY OF LETTER containing some interesting information relating to the late Mr. **Elmes**, Architect of St. George's Hall, Liverpool, read at the Ordinary General Meeting of the Royal Institute of British Architects, by W. **Tite**, Esq., M.P., Fellow.

T. L. **Donaldson**, President, in the Chair.

Liverpool, *December* 9*th*, 1863.

Dear Sir,

I have been somewhat amused with the discussion you have had with Mr. Rawlinson, on the subject of the part which he took in the construction of the roof of St. George's Hall. In my public capacity I was drawn into frequent communication with poor Mr. Elmes. I knew nothing of him, until his works brought him into notice here, but his great talent, accompanied with the extraordinary modesty he shewed in the possession of it, led me to regard him as an intimate and valuable friend. Upwards of twenty years ago, a portion of the clergy and of the public, set their faces against oratorios being performed in the churches. It was therefore determined to erect a Music Hall, and a large subscription was collected for this purpose. A committee was formed and an advertisement issued for Plans for the Building, to be sent in under a motto. There were from forty to fifty competitors, and there was no great difficulty in coming to the conclusion that the plan of Mr. Elmes was the best. Before the prize, however, was allotted to him, it was thought right to ascertain whether it could be executed for the sum specified in the advertisement. Mr. John Stewart, with whom you are well acquainted, was sent to London for this purpose, and if my memory does not fail me, he was surprised to find so young a man, so well informed upon every subject connected with his business. Mr. Stewart reported that Mr. Elmes had satisfied him, that the building could be finished for the sum named.

At the commencement of these proceedings, the business of the merchants had all the appearance of being in a most prosperous condition; but before things were ripe for beginning our operations, a black cloud gathered over Liverpool, which was the cause of their being suspended for a long time—our difficulties were at length removed by the Town Council, coming to the conclusion, that they would erect Courts of Law for the County Assize business, containing a Music Hall with them. Mr. Elmes having shewn so much talent, was selected as the Architect to prepare the plans—this was a proud post for him to occupy—but the labour it entailed upon him shortened his days on earth. His sudden rise prevented him having any youths of talent under him, who could assist him in his work. He was compelled to labour hard himself, not having the pecuniary means to pay for the assistance of others. He had a poor constitution, shewing marked symptoms of an affection of the lungs. Having brought his plans into a state which enabled him to commence operations, he thought himself fortunate in securing the services of Mr Rawlinson to superintend the construction of the foundation of the building, and I know, that he was very well satisfied with the services of that gentleman, who had previously been employed under the Bridgewater Trust as Inspector of the Canal. After some years of hard work, it was too clear that it was making a serious impression upon his health. He had then pretty well matured his plans, and I induced him in 1842 to accompany me in a tour to the Continent—my companions were two ladies and another gentleman. We went through Belgium up the Rhine to Frankfort; there I hired a carriage, posted to Wurzburg, Bamburg, Nuremburg, Ratisbonne, Munich, through the Bavarian Highlands to Salzburg, thence to Innspruck, Fussen, Augsburg, Ulm, Stuttgart, Heidelberg, Darmstadt, and back to Frankfort. In your travels you will, no doubt, have visited all these places, and you will know the many objects of interest they contain, especially to the architect. At Munich I accompanied Mr. Elmes to the roof of the Jesuits' Church, where we spent a long time, as he wished to ascertain various particulars respecting its construction, as he had formed the design of having a roof constructed of brick over St. George's Hall. With the aid of a dictionary and some slight knowledge of German, I was enabled to assist Mr. Elmes in his enquiries.

With his enthusiasm for the arts, you will easily imagine the delight he experienced in the excursion I have been describing, and it gave me singular pleasure, to see the striking improvement in his health, arising from the relaxation of the mind. He returned to his work with renewed strength, but unfortunately many years did not pass over his head, before he was again obliged to seek a more genial climate than we enjoy. When I took leave of him a week before he sailed for the West Indies, it was too clear that he would leave his bones there. If he had had health and strength to have pursued his business, he would, in all probability, have risen to great eminence. There are several private residences in this neighbourhood built from his designs, all different in character, but all shewing great taste, and excellent in their arrangement.

Excuse my having written to you so much in detail, but as you have taken an interest in the reputation of our departed friend, I thought I would tell you what I knew about the roof of St. George's Hall.

Believe me, dear Sir,

Your's very truly,

WILLIAM EARLE.

William Tite, Esq., M.P. &c.
42, *Lowndes Square.*

OPENING ADDRESS BY THE PRESIDENT,

At the Ordinary General Meeting of the Royal Institute of British Architects, November 2nd, 1863.

GENTLEMEN,—Even within the few months, which have passed since we met in this room, several events have occurred interesting to us as a body, interesting to us all individually. I shall therefore trespass upon your patience for a short time, as I pass in review some of the more important topics connected with our Profession.

In the first place it is due to a great man, who has recently passed away from us, to notice the death of our distinguished Fellow, C. R. COCKERELL, R.A., our first Professional President, and the first member whom you honored by your choice, in the award of the Royal Gold Medal. It is not for me to anticipate, what we may ere long hope to hear read at one of our meetings, a full and complete memoir of our departed Friend. Nor shall I repeat what has already been aptly said of him in various journals. But perhaps I may be allowed shortly to notice somewhat of my own personal impressions during an intimacy, and I am proud to say a friendship, of above forty years standing. Mr. Cockerell's earliest professional experience was under Mr., now Sir Robert, Smirke, in whose office he was during the few months in which the late Covent Garden Theatre was being built. Here he had the most favorable opportunity of acquiring a knowledge of Architecture, as that building was considered at the time a masterpiece of conception and execution in its structural details; and his taste must have been refined by the elegant and chaste artistic decorations of the interior, which were a theme of admiration to all lovers of the art. He then proceeded on his professional travels through Italy, Greece, and Turkey, preceding me by some years; but the remembrance of him was still fresh in the memory of many friends I made there, and his praise was the constant theme of all. His handsome person, his clear blue eye, his pleasing expression, and graceful manner, a taste the most refined, a varied and extensive knowledge of Art, his free and masterly style of drawing, his genial generous disposition, irresistibly won general admiration, and he was considered the type of a polished and gifted Architect. His presence in Greece threw him entirely into the society of foreigners desirous to win his friendship, and he as anxious, with a modest consciousness of deficiencies yet to be supplied, to avail himself of their experience, their researches and their superior attainments. He was most fortunate in being thrown among such men as Barons Haller and Von Stackelberg, and Herr Link. The first especially was a very advanced Architect, a ripe scholar, perfectly master of Greek art,—and through his counsels Cockerell acquired a deep insight into that peculiar and spiritual mystery of power on the mind, which reigns in the ancient monuments of that classic soil. With these earnest companions, who fathomed the inner soul of every monument of that refined people, he studied, and measured, and drew, and reasoned, and reflected, with joy and love for the subject, and with the patience and fire, which kindled emulation in the whole group. You may well imagine how they investigated the hidden secrets of those historical monuments, connected with the earliest associations of their boyish studies, and with the renown of the heroes and poets, writers and artists, rulers and sages of the classic times. The very soil was sacred to them. Each grove, each rivulet, each mountain and each valley, had its power over their minds, and under that bright sky pursuing their studies, amid such scenes, and in the presence of such inspiriting monuments, you must allow with me, that it must have been the poetry of their existence. They also associated with Gropius the Austrian Consul, and Fauvel the Consul of France, and Lusieri, whose laborious and vivid pencil drew those exquisite views of the Buildings of Greece preserved in Lord Elgin's Collection.

The two Consuls had galleries of choice antiquities, and a quick perception and knowledge of Greek art. Mons. Fauvel especially was endowed with a natural instinct and brilliant fancy peculiarly valuable to the student, qualities rendered more precious still by frank candour and generosity of disposition.

And here I would notice, by the bye, the advantage which the English artist acquires by mixing with his foreign brethren in art. He soon discovers that they see with other eyes and under different impressions the same objects—their mode of appreciation has another rule.—They may perceive beauties or defects, where he finds the reverse. At first he may feel dissatisfied with their judgments, and may think them crude and defective; but when once he can reason with them, and learn their grounds of approval or dislike, he will find that it may not be without some shew of reason, that they may have arrived at conclusions different from his own. They may be right or may be wrong; but he becomes conscious that perhaps he may be biassed, too often by prejudice and by a judgment formed in the school in which he may have been trained, and by the one groove of thought in which the mind may have been accustomed to move, and which may have induced the adoption of ideas, requiring re-consideration and re-modelling ere he can arrive at truth. And he, who is once induced to doubt his own judgment and to reason frankly, is in a fair way of getting at the truth—for his ideas are enlarged, and he is freed from the trammels of bigoted notions as to art. Thus fifty years ago, ere our intercourse was opened with the Continent by the peace of 1816, Mediæval art was called English architecture, it being supposed to have originated in this country and carried to its climax of beauty here: but soon our intercourse with the Continent induced a healthier judgment. Perhaps I may be permitted to add, that Mr. Cockerell and myself have found among our Foreign Brother Artists a readiness to accept our friendship, a liberal and frank interchange of thought, a courteous willingness to supply any information we might require, and to open to us their portfolios or lend us their drawings; in fact, to an interchange of all the social and artistic courtesies of life. And, I am happy to say, that these feelings cannot but be confirmed, if not increased, by the manner in which this Institute has enrolled so many Foreign Architects among its Honorary Members, and sought, by the liberal award of the Royal gold medal to several Foreign men of distinguished merit, to draw closer still the bonds, which should unite in one common accord the Profession throughout the World.

It is from the combination of these circumstances, the association and congenial studies with foreigners, and a readiness to entertain the ideas of others, as also from his ability, when thus enlightened, to acquaint himself with the monuments of antiquity, in fact to acquire a thorough knowledge of the whole range of the sister arts, that Mr. Cockerell was able throughout his career, to advance with the new laws of art brought to light by the researches of successive travellers; to appreciate the fulness of the polychromatic theory; and to hail with generous delight the discoveries and minute investigations in the Parthenon of his friend and successor Mr. Penrose. It is not to be supposed that he needed the counsels and support of his fellow travellers in the whole course of his studies. The delightful illustrations, which he made for the pleasing volume of Beaufort's Karamania, shew how completely he entered into the gorgeous magnificence of the Greco-Roman antiquities of those splendid cities, along the South Coast of Asia Minor. In Sicily also, where our common friend, Raffaelle Politi, who still survives and is one of our Honorary and Corresponding Members, had made the excavations of the Temple of Jupiter at Agrigentum, he composed that fine restoration of the section with the colossal caryatide to the clerestory of the Cella, which I prevailed upon him to publish in the Supplementary Volume of Stuart's Athens. In his beautiful drawings of the Buildings at Pompeii, he displayed with graphic skill the peculiar sentiment and grace of the architecture, sculpture and decorative painting, and revived as it were the domestic life of the Pompeians, with as much facility as he rendered the existing realities of Ali Pasha's Audience Hall at Yanina.

Throughout his whole life architecture was to Mr. Cockerell what Coleridge describes poetry to have been to himself—"Poetry," he said, "has been to me an exceeding great reward. It has soothed my afflictions; it has multiplied and refined my enjoyments; it has endeared solitude and has given me the habit of wishing to discover the good and beautiful in all that meets and surrounds me." So was architecture Cockerell's passion and delight—he followed it not from mere mercenary considerations. He spared not himself to revise, correct and chasten each vivid idea as it presented itself to his fancy, and which he appropriated to his work on hand; he was never weary if he could improve, and anxious for novelty he occasionally transgressed the severe principles of the Antique. In fact, if fault could be attributed to a man of such genius, he was, perhaps, often too fastidious, and occasionally ready to retouch and to adopt a supposed improvement, where possibly the original thought was simpler—wiser. In him the young architect found an encouraging monitor, and one of kindred feeling; ever ready to assist and to discover latent talent. And perhaps one of the most remarkable traits in his character was, that, with all his prepossession for the chaste and simple sublimity of Greek art, he could bow, as before a superior and supreme spirit, to the genius of Wren, whose noble productions are at such variance with the supposed canons of antiquity.

It is a circumstance to be remarked that Mr. Cockerell did not join this Institute as a Member till 1849, that is fifteen years after its foundation. This did not arise from any want of interest in its success; on the contrary, he considered it as most honorable and useful to the profession. But he thought himself bound in honor and by the laws as a member of the Royal Academy not to belong to any other artistic body. Sir Robert Smirke had from the first joined us, but it was as Honorary Fellow. When Mr. Barry, however, then a Fellow of our Institute, was elected a Royal Academician, and did not cease to be a Fellow of our Institute, he felt himself released from the supposed obligation, and at once sent in his allegiance and became a Fellow. I shall not occupy your time further on this interesting topic by analysing the productions of our late friend, his works are before the world, and you are competent to form a judgment yourselves: besides which such a review would require longer deliberation, and that will be given in the more complete biography which is now preparing.

He has been to us an example, while living, as a man of the highest honor, intense sensibility, generous sentiment, refined taste, and deep knowledge of architecture: and may the memory of such noble qualities have its influence upon every generation of his successors, whatever theory they may entertain, whatever style of art they may pursue.

There is still one other consideration connected with the memory of our departed friend. With the gracious concurrence of the Dean and Chapter of St. Paul's, we buried him with the noble and great of the land. Whatever may be the strivings and antagonisms or even jealousies of practical life, as architects we must all feel a just pride in the reflexion, that we have our Barry in Westminster Abbey and our Cockerell in St. Paul's.

Mr. JOSEPH GWILT is another of our Professional Brethren, who has died during our vacation. He was a man of superior attainments, as a classical scholar, mathematician, musician, and astronomer, besides his acquirements as an architect. In his earlier professional life he adopted the prevailing passion for Greek art; and here we must not confound real Greek art with its many applications at that time in this country. You may apply the general proportions, the decorations and details of a style, in all the minutest accuracy to any particular building, but unless you adopt also the appropriateness, the fitting sentiment and destination of the original, and produce the same impression and convey the same idea, it becomes senseless imitation, and of course devoid of its proper sentiment. Thus the Greek Doric in its noble proportions was travestied, and that which in a Heathen Temple assumed the impressiveness of a consecrated tradition, proved when rigidly applied to a Christian place of worship or a theatre devoid of propriety and instinctive life. Not that there is one only religious architecture, for there is no style incapable of producing religious impression, and therefore no style can be called profane. The Romans, when they adopted the Greek canons for their buildings, did that with a liberty and grace, which imparted to them individuality of sentiment. The triumphal arches, and the monumental columns and amphitheatres, are evidences of their power of a proper transfusion of feeling to other purposes of existing forms. When the Italians and French in like manner revived the taste of Classic Architecture, they also modified it and imparted to it the charm of an individuality neither precisely Greek nor Roman, as that of the Cinque Cento and Renaissance period, which drew a broad line of demarcation between the type and its free imitations. Hence it is that Greek Art in this country, not having been studied and applied with the like views and similar sensible treatment, failed to maintain the position it acquired under its earliest cultivators, and a noble opportunity was lost of falling back upon the manly, chaste and profound laws in art of the most refined people who had ever existed, and the full and judicious application of which we can never know, for almost all but the Temples of Greece have been destroyed for ages, and we have few records of their other monuments left behind.

Mr. G. Tappen who had been travelling in Italy, and who brought home a portfolio rich in the studies of Italian buildings, and the fruits of which he published, returned with a deep admiration of the works of Palladio and his compeers. He imbued Mr. Gwilt with the like feelings, so that henceforth his style was formed on that of the Italian schools with Vignola at their head, and of this predilection a notable instance occurs in the buildings he erected for the Grocers' Company, in Princes Street, opposite the Bank of England.

He was a prolific writer, his works being distinguished rather for diligent research and as useful compilations, than for originality of information or remark. His translation of Vitruvius was a faithful rendering of the received text of the Roman; it is to be regretted that he did not fall back upon the original codices for which his classical attainments peculiarly qualified him, as well as his laborious patience for such researches; or did not adopt Schneider's masterly and expurgated edition of the great master: he accepted the corrupt readings of Jocundus and his followers down to Galliani. The plates are most carefully engraved, but the illustrations do not reflect the majesty of Roman art. His architectural notes upon the buildings of Italy are a very useful compendium for the traveller and student. But his great work was the Encyclopædia of Architecture, containing much practical information, well compiled from various authors. He was consulted by the official department of the Government in re-modelling on the two last occasions the Building Acts of 1843 and 1854. He removed many inconsistencies in the old enactments, and he sought to simplify the regulations by some curious abstract theories superseding useful working data, which are much more easily understood by the practical man. He was a member of this Institute at the first, when his adhesion was very influential, and he assisted materially by his experience and business methodical habit of mind, in drawing up its original constitution: unfortunately some difference of opinion of no very great moment arose, and suddenly broke off the connection. I am happy to learn that his Memoir, written by his Son, Mr. John Sebastian Gwilt, will be read at one of our early Ordinary Meetings.

One of the most important proceedings of this Institute has occurred during the late recess of the ordinary operations of our body. I allude to the prompt and vigorous measures adopted in order to prove to Parliament and to the British Public the impolicy of preserving the Exhibition Building of 1862. As soon as notice was given in the House of Commons, that it was the intention of Government to apply for funds to purchase the Building, and for laying out a still larger sum in order to render it adequate for the purpose of a National Museum for the reception of the natural history division of the British Museum, a meeting was called for by some of the Fellows, and the Council convened, as you know, a Special General Meeting to consider the matter. The Committee appointed to survey and report their opinion, examined the Building and drew up a well digested temperate statement. They abstained very wisely from more than briefly touching upon the æsthetical considerations connected with the Building: and they confined themselves rather to the proofs, that, erected for a special purpose under certain special conditions and to answer a specific end, which they did not deny it might have satisfactorily fulfilled, it would be an unwise measure to attempt to convert it into a permanent building for which it was not originally designed, its distribution being irremediably deficient, its construction unstable, its materials unsound. Consequently that the scheme for its purchase and proper transformation was impracticable and fraught with unprecedented probabilities of discredit and disappointment. This judgment of the highest professional body in the United Kingdom was irresistible; and was indorsed by the House of Commons, who negatived the proposition by an overwhelming majority.

It might have been supposed that this decisive result, supported as it was by the expressed opinion of the whole of Europe "that this Building was a grave discredit to the artistic reputation of England" would have effectually suppressed every attempt to retain it, but some letters soon appeared in the *Times* pleading for its maintenance. In September last, Mr. Adderley, M.P., at the distribution of the prizes at the Stoke-upon-Trent School of Art is represented to have said "that nothing had shewn him more the want of the appreciation of the first principle of beauty in this country than the fact, that the representatives of the people had voted recently for the demolition of the National Exhibition Building. There was of course no disputing about taste, but the vote of the House of Commons shewed that some members were incapable of appreciating naked design without the assistance of ornament. It showed also an old puritanical spirit of disinclination to patronise art. He should look to schools of art for any hope they might entertain for any better building than that which had been so ruthlessly demolished."—The opinion of such a speaker in the face of facts has little effect. The puny efforts to reconcile the inherent defects of taste in the original Building with a facing of so-called architectural embellishments, as exhibited on the walls of the Royal Academy, proved the futility of the idea to give grace and beauty to inherent deformity. And the Institute itself in its petition to the House of Commons broadly stated their "preference for the bare brick wall and the iron skeleton in their rude integrity, as far less discreditable to the country, than any amount of mistaken ingenuity expended in the production of such questionable grace." So far for the attempts of the Member for North Staffordshire to justify the beauty of the Building, and his remedy to be found in the Kensington Branch Schools of Art. It is to be hoped, however, that none will be lulled into the visionary notion that the forbearance of the public or of the House of Commons will endure the maintenance even of a portion of the Building, and that no frantic endeavour will be made, on the score of convenience or adaptability for art, to allow of anything less than the entire sweeping away of the excrescence, which disfigures what should be the finest quarter of the metropolis, so judiciously laid out by H.R.H. the late Prince Consort.

To maintain the high standard of English art and science at a time, when all the other branches of practical knowledge are cultivated with a zeal rich in fruits of the past, rich in hopes for the future, is now the great aim of the profession. But that which strikes the mind, as one contemplates the present condition of architecture, is the remarkable phenomenon of the number of intelligent and gifted architects, who now stand as men of mark before the world, and the fine edifices which British genius has produced all over the United Kingdom, contrasted with the low and apparently neglected state of architectural education up to the present time. And when I say architectural education, I mean the absence of any recognized and adopted system. Here the student is left to his own sympathies, his own inspirations, the suggestions of his own zeal more or less active, and to his unguided experience casually gained in the office of his master, where he can become familiar only with the taste and science of the works there carried out. We do not possess the professional recognized ateliers of the Professor, as in France, where gratuitous courses of lectures also, periodical prizes and grand competitions in the schools, and the stimulating intercourse with well known associates, and the pride of the school keep up the spiritual earnestness of the student to a high wrought pitch of excitement, and nerve him to energetic efforts for eminence and success. On the other hand we have to congratulate ourselves that we have no governmental rigid routine scheme, as in Germany, binding down the taste and study of the youth to one formal line and process of artistic thought. Still, I say, though many of these sources of encouragement and instruction are not available for our young aspirants, yet our profession has produced men of the highest merit, who have entered upon the arena of European competition with the greatest honor, and carried off the noblest prizes even on Foreign ground.

It must be allowed therefore, that the student has had hitherto to labor under great disadvantages, which at length became intolerable, and after many strivings the wants of the younger followers of our art forced themselves upon our attention. The Institute consequently matured a broad scheme of competitive examinations, which points out the branches of knowledge to be studied, and the extent to which they must be acquired, in order to gain distinction. And thus the contest of life is carried on and the benefits are not merely resulting to the individual, but are diffused throughout the whole mass. The success of one fires the ambition, stimulates the ardor, and excites the hopes of his fellows. He struggles on and studies, and perfects also his mastery of drawing. He loses no opportunity of improvement, observes, records, and thus strengthens his mind with materials for the future life of action. The sluggard becomes ashamed and is roused from his torpor—the indolent throws off his indifference—even the weaker in intellectual power feels that his capabilities will be improved, strength given to the mind, facility afforded to his manipulations—that there is a field open to him, and that pains-taking and laborious pertinacity, honest industrious hard work may find its reward, though not so high perhaps as that of lofty genius, but still an useful, honorable, remunerative position. The high prizes in all callings are only for the few. We see that in the church, in law, and in medicine. But there are nevertheless notable rewards for those, who fill up the intermediate grades of necessary usefulness in the great scheme of social life. These examinations are also useful, as affording the young man a true index of his powers and of his weakness. If he fail, he knows in what department he must work on to acquire the knowledge in which he is deficient. It is better that he should ascertain where his weakness lies thus early, than that he should be taught it by a disastrous failure in professional practice.

Thus the pupil with a purposeless and vague scheme of study in his mind, has been taught an useful lesson, and learns that positive well-grounded methodical knowledge is superior to dreamy idealities of an unstable mind. That the sooner he puts off his indolent habit of thought the better, and the earlier he begins to methodize his mode of study, and seek a higher standard of attainment, the sooner will he gather the fruit, and the *riper* that fruit will be. He will find, that it is of no use to defer setting to work—the result of this preliminary contest with his fellows will but foreshadow the results of after-life competition. If in the one he fails and amends not, in the other he will be sure to be as far behind, with consequences still more serious. Even in my own classes at University College, I can at once distinguish the hopeful student of future years. The earnest attention he bestows on the subject—the eagerness with which he takes into his mind every atom of useful information, and notes them down in his memoranda—the accuracy and care with which he keeps his note book, and the fullness and variety with which he enriches and illustrates the reports of the lectures, which I occasionally require of my class during the session; all these indications prove to me, that such and such will carry off the prizes and higher certificates of the academic year; and I feel assured that they will afterwards gain the great prizes of professional life.

And thus must it be in these competitive examinations established by this Institute. It is a generous emulation in which each seeks to rise higher than his fellows, not by striking down his rival, but by more practised and skilled attainment to reach an excelsior height.

The examination papers shew the progressive steps, from the earliest elements of knowledge up to the higher ranges of creative thought. In the execution of buildings the artizan possesses, as the basis of his knowledge, the plumb line to ascertain the perpendicular or vertical, and tube of water to decide the level line, and without which elementary data it would be hardly possible for the practical man to move one step. But it is upon these simple tools, resulting from the general law of gravitation, that is built up the theory of construction, which renders the Pyramids in their vast extent true to that great law of the universe, and which gives to the Parthenon its stability, and to the magic productions of the Middle Ages that equilibration of vaulting, which suspends masses in mid-air with the slightest aid of solid support. Science and laborious study can alone teach this, for the results are not fortuitous, but proceed from the deepest theories and the largest experience. The student, far from being discouraged, should be encouraged by the fact; for one step leads easily to another, and the energy which can rise up the first round, can as easily surmount the other rounds of the ladder of fame, and each succeeding one will be the easier conquered, and the greater pleasure experienced in the pursuit as success confirms hope and practise increases strength.

We trust therefore in January next, to see our young friends come forward to these examinations with as much zeal as at the last and in undiminished numbers. Then will the profession raise each year its standard of proficiency, and achieve new triumphs in the monuments which will be erected; until in taste and skill they will not only equal but excel the works of Greece and Rome and of the middle ages, which have hitherto borne the palm of unrivalled excellence.

I have to notice another point connected with the education of the young Architect, which is the short time in which Parents and Guardians imagine that a youth may be qualified to start on his professional career. I have been asked by some if three years would be too much; and I know cases where a four years' apprenticeship was considered a species of interminable bondage. There cannot be a doubt that to revive the term of former times, of seven years' clerkship in the office, would be a sacrifice of much precious time; but when we look at the papers of our competitive examinations, the term that may be usefully passed in the Builder's workshop and with the practical measurer, and the thorough routine of practice to be acquired in an Architect's office, we cannot doubt that six or even seven years may be usefully and agreeably spent by the youth, who desires to be an earnest, thorough, well grounded practitioner, and to enter upon the real battle of life armed at all points, and capable of undertaking any responsibility.

In speaking of the professional career I must venture to urge the importance of young men acquiring the business qualifications of practical life, as being essential to their satisfactorily realising all the fruits of the more intellectual departments of their pursuit. And I do not mean, to say that the most qualified are always and necessarily the most successful, or even when successful, carry off the crown without a thorn to remind them of the instability of all human enjoyments. There is so much of business mixed up with the artistic portion of our profession, that often does patronage or chance, and even the very incompetency of Committees or Patrons, or cunning, win the premium from the more deserving. The very tendency, as in the other Professions, to throw every thing, good or bad, great or little into the hands of a very few who may stand at the top of the tree, prevents that fair distribution of employment, which would foster rising talent and reward other meritorious members.—Again, the want of a distribution of Patronage by the Government in the many works they have to execute, prevents that fair encouragement to those, who after many years of wearisome toil may have carried off the highest prizes of our schools, and spent a little fortune in foreign travel, and then starting into practice find all their fair claims to notice disregarded, and themselves unheeded: as though they had no claims to distinction and deserved not the slightest token in recognition of their studies, their sacrifices, and their merits. In fact the Government very properly expect to employ men of the very highest talent, and yet make no effort, contribute nothing to place the means of instruction, improvement and subsequent encouragement within the reach of the earnest aspirant. But there is the like realization of bitterness even to those who have carried out the noblest works, and stand the objects of envy and admiration to the unthinking. Of such three striking instances occur to my own mind. The Committee for the Building of the International Exhibition of 1851 consisted, as you know, of six members—three Engineers and three Architects: of the six "quorum minima pars fui" I am the only survivor. To three of these, my colleagues, I allude,—Isambert Brunel, Robert Stephenson, and Sir Charles Barry; and all will allow that they were fit representatives of varied mental qualities in their several pursuits.

Brunel—brilliant, quick, full of resources, impassioned. Stephenson—solid, thoughtful, calm, and deliberative. Barry—profoundly acquainted with his art, master of various styles, a sound thinker, and rich in imagination. All of them at the top of their profession, and having had to execute critical works of the highest class.

When the first section of the Great Western Railway was open to Slough, the success of the continuous bearing system of sleepers seemed a triumph of Brunel's sagacity. He had accomplished a great reform and established a new theory, and one might have imagined that the moment, when he received the congratulations of a numerous assembly of scientific men, would have been the happiest, proudest of his life. But I recall well the words as they fell from his lips, when with somewhat of a depressed tone he acknowledged the compliment paid him and said, "however fair all might seem and however prosperous the experiment that day had proved, there still remained much of care and anxiety and responsibility and doubt, ere he could realize to himself that he had indeed succeeded."

When the last tube of the Menai Bridge was to be raised, Stephenson invited his colleagues down to witness the operation. Barry and myself alone could avail ourselves of the opportunity, and we saw the marvellous combination of simple expedients, by which the huge mass was floated down to its position between the piers, and the rapidity with which the enormous weight was raised some tens of feet, and without the slightest pause, or irregularity, or disorder lodged in its permanent resting place. On this occasion we heard him declare in reply to the felicitations of a large company, that not all the triumph, which attended this great work, and the new solution of the difficult problem of a rigid roadway at such a height, and carried across such a stream so as to allow the largest vessel to pass with all its sails set beneath it, could repay the anxieties he had gone through, the friendships compromised and the unworthy motives attributed. And were another work of like magnitude offered to him with such consequences, he would not for worlds undertake it!

We all know how our sympathies were excited by the ordeal of twenty years, through which Sir Charles Barry had to pass for the completion of the Houses of Parliament. At the first an unworthy attack from certain competitors—Committees of the Commons—Committees of the Lords—A succession of Chief Commissioners not always favorable—An extravagant system of warming and ventilating thrust upon him at a cost of £80,000. to the nation—and even the creation of his own prolific genius attributed to another eminent in the art, but who was too generous to allow such a misstatement without the directest denial—and then again the parsimony of the Treasury abstracting from the man of genius his fair professional reward. All these harassed and embittered the life of our friend, and deprived him of the unclouded joy he ought to have felt in having executed the most important building of modern times, and in having endowed the metropolis with one of its noblest features.

Such may be lessons to every one, and I recall them not to depress, but to strengthen all under the greatest difficulties; and to shew that, whatever the struggles they may encounter, whatever unjust aspersion they may have to endure, it is but the common fate of genius and success; and that after all the only best reward is the consciousness of having done one's duty, and not the smiles or favors of a fickle admiration. So true is the wise observation of Guizot at the conclusion of his Life of Washington: "That success even does not efface the sad impressions, to which the combat of active life gives rise; and the fatigue contracted in this arena is prolonged even in the calm retirement of repose."

Passing to the subject of the nature and quality of our professional publications, I think it must be acknowledged that the architectural illustrated works of late years, with the exception of Mr. Cockerell's last volume and some other works, have not maintained the high standard, which was generally prevalent some years ago.—Where it is the intention of the author to publish transcripts of his own sketches, and not seriously and elaborately worked out drawings, lithography is undoubtedly the best imitation of the crisp, sparkling and off hand pencilling of the artist. But wherever the graver is used, it should be with the delicacy, refinement and finish, which distinguish Stuart's Athens, the volumes of the Dilletanti Society, or the works of Britton, Pugin, Blore, and such standard authorities. The loose, scratchy and guess-work execution of some productions do not worthily represent the art. The French, on the contrary, and the Germans execute their engravings more elaborately and carefully, and with a higher finish. At this time there are two works publishing by Mons. Daly at Paris, and there is one in London, professing to give practical examples of constructive architecture, and they allow of a comparison on this subject. The English work is a compilation of examples without selection. Details are given of cornices, mouldings and other details, possessing no special beauty or grace, and taken apparently from the ordinary volume of Gibbs of the last century. They are drawn to an enormous scale, as though the editor did not care to take the trouble to reduce them to a manageable size, and many of them repulsive from their vulgarity. There may be an excess in point of scale, and parts drawn to the size of execution often unnecessarily encumber such a work, and render it ponderous. In fact, the reader had better be referred at once to the original work from which they have been copied. Great discrimination is required in works of this class, certain elements of selection should be observed, a degree of merit in point of taste and of talent as to the construction. There is no doubt that, in mere matters of execution, there may be many instances of most ingenious skill by practical mechanics, engineers and others, who lay no claim to taste, and whose previous education may not have qualified them to invent combinations of form and detail, so as to invest construction with the nobility of artistic grace. In instances such as these an editor of such a work would be wise to confine himself to the mere portions embodying the true value of the example, the scientific disposition and combination of the parts. But to give what is *intended* for mere ornament, but which is in truth mere disfigurement and caricature, is to be unjust to the designer and lay bare his weak point. Although the price of such a publication to be generally purchaseable should be placed at the lowest remunerative figure, yet the execution ought never to be coarse and negligent; nor should there be neglect either in the selection or arrangement of the details. Nor ought it to be a reproach that many of the finest and most interesting and instructive works of recent time are absent; as though mediocre practitioners, anxious to make their names known, may have been but too happy to volunteer illustrations; and the editor no less ready to accept the costless sheets, which might swell his work at little expense.

Mons. Daly's publications offer a striking contrast to the preceding, though they have somewhat of a like object. The illustrations of the Revue d'Architecture are drawn and engraved with the utmost refinement and finish, and shew an earnest loving treatment of the subjects. And I must notice with emphasis the graceful and elegant manner in which he has got up the Architecture Privée, or Domestic Architecture of the Nineteenth Century, under Napoleon III., being new houses of Paris and the suburbs, consisting of plans, elevations and sections, and details of doors, windows, staircases, painted decorations, chimneys, gardens, &c., the plates all executed on steel. The selection is made with peculiar care, and I feel that those, who are refined in taste, will always require in such illustrations the chaste rendering of such a work as this, which can alone worthily illustrate whatever there may be of graceful design in the original, and which a coarse execution will only debase and disfigure. We might wish less repetition in the examples of the same sentiment, taste and distribution, and which becomes to a degree irksome, and we may desire more practical details as to the structural combinations: but in point of execution these volumes are fine instances of care and finish, and offer a standard, to which it would be desirable for us not to be inferior. We were the first in our Stuart's Athens to give the highest tone of illustration for architectural works, which the French have been eager to equal and surpass.

You will recollect with what careful deliberation the Institute drew up a scale of charges for professional services. It was anticipated that this would prove an useful guide, producing uniformity of practice on this delicate and important point. And, at the same time that it justified the Architect in his fair claims, it should prevent an exaggerated charge for remuneration discreditable to the general body of the profession, and happily many cases have occurred in which such questions have been settled to the satisfaction of parties by mere reference to this scale, and legal intervention and misunderstandings avoided. But I am sorry to say, that instances have arisen in my own experience with regard to some practitioners, not members of our body and imperfectly acquainted with its scope and tendency, in which this scale of the Institute has been quoted to support unreasonable demands, and although worded with every care to avoid misinterpretation, it has been adduced to justify claims greater than intended or justifiable. It is to be remembered by us, that this scale was meant not merely for the protection of the employed, but also for the protection of the employer; and that any attempt to contravene that great principle, and to render it a pretext for an excessive recompense will be contrary to the spirit of integrity and high honor, which should distinguish such a body as ours. Wherever called upon to give an opinion as to its intent and bearing, any doubt which may arise, should be interpreted in the most liberal manner for the Employer, since it was our Body which drew up the scheme. Upon no other ground will this scale of charges be entitled to be considered as fair and impartial, or referred to as equitable, authoritative and conclusive upon such questions.

It is subject for satisfaction to notice, that the Metropolitan Board have with most creditable despatch, recently accepted a tender to the amount of more than half-a-million, for the execution of the portion of the Thames Embankment on the north side from Westminster to Waterloo bridge, and that particulars are preparing for the section from the Temple to Blackfriars. It is to be assumed that the like movement may take place in regard to the South side, and that thus our noble river may have its banks faced with a continuous line of quays, which will at the same time sweep away the mud deposits that poison the water and the air, and will give it that aspect of majesty suited to the metropolis of a great Empire. It is gratifying to observe that the leading features of these quays will display a certain artistic treatment and will not be like the railway bridges, which span the Thames in the same locality, hideous masses of utilitarian skill. We congratulate also the public in London and Dublin upon their being roused to the consideration of the frightful erections contemplated by railway companies, and of some which even now deform certain of our principal thoroughfares and threaten others. There has been too much indifference hitherto to the important influence of architectural taste on the convenience and enjoyment of the public. If proposed works embodied an useful purpose, the consideration of their forming decorative objects was regarded as non-essential; and we have thus certainly allowed many disgraceful disfigurements in the metropolis. In France it is the reverse. As in Athens, the rude speaker however eloquent, who sinned in his grammar or his quantities, was hooted down, so in Paris public improvements are not tolerated unless treated as public embellishments. The consequence is, that Paris under the spirited and enlightened renovations of Napoleon III, seconded by the æsthetic tendencies of the public mind, has become the queen of European capitals. She leaves all others at an immeasurable distance by the noble disposition of the new thoroughfares, the amplitude of the streets and public areas, the nobility of the public edifices, and the tasteful decoration of the private dwellings. It has become the fitting and enjoyable residence of a highly-refined intelligent people, whose life is not wholely absorbed in the cares of business or the mere mania of amassing wealth.

Much of this conduct of ours arises, in part from the unwillingness of the Government authorities to incur responsibility, still more from the niggardly parsimony of Parliament to afford the requisite funds. Only the other day the Chief Commissioner was precluded from entertaining the proposal to make the newly-proposed and leading street from Blackfriars to the Mansion House, 80 ft. wide, instead of 70 ft., because he felt assured that Parliament would refuse the extra amount (some £100,000.) And this in the face of the increasing traffic in the City, and the inadequate width of any of its largest thoroughfares. My feeling is, that it would be wise in Parliament, as being of the highest benefit to the Empire, if public subventions, as in France, were given in order to promote a spirit of reformation in our towns. There are many which, by the tide of manufactures and commerce, have from insignificant villages become emporiums of trade, and, however extended in all directions, have retained the original narrow high street and the ways and alleys opening thereunto, so as to maintain and paralyse additions into the like stinted dimensions. They thus still present cramped tortuous lines of communication without one grand avenue from north to south or from east to west, to open up the way for the teeming tides of living beings, who swarm the streets, hustling and impeding each other, or for the carriages, waggons, carts and animals huddled into one mass of dead lock. If such contributions were once freely accorded in a certain proportion to any municipality, who would undertake the task and provide the main funds, we should soon find the spirit of improvement arise, petty local jealousies put to flight, higher aims entertained, and hopelessness of improvement superseded by energetic efforts to ameliorate and correct, and to accomplish grand and useful projects. Oh! for a ten years of the liberal and tasteful spirit for improvement, which now pervades the whole of France, and England would accomplish great things.

There is also required some immediate interference by Parliament for the purpose of securing to the labouring classes more fitting dwellings, than those swept away to make room for the metropolitan railways. There is wanting a greater consciousness of parental care in the authorities, whether the Parliament or the Government, to grapple with this difficult question. It is hedged in with difficulties; it is no one's special business; it carries with it no profit, and would have only the thankless reward which usually attends philanthropy. But it is a duty—the health, the happiness or misery of tens of thousands is involved in it; and it is a crime that, as a principle of action no longer to be deferred, the proper housing of the working classes lies in abeyance, and Parliament is heedless of the sufferings of the poor and of their duty to undertake the remedy.

Mr. Hansard informs me that the Artificial Stone Committee, appointed in March last, have held eight Meetings and investigated several processes, and tested by crushing at different dates after their manufacture each series of samples. These proofs necessarily take considerable time at each Meeting, and extend over many weeks; this has prevented the Committee from being ready with their Report at this the commencement of the Session. They think it likewise advisable, before arrriving at any conclusion, to submit several of the samples to the exposure of the weather during the winter season, and to note the effect, if any, of frost after wet, or sudden change of temperature upon them. During their investigation the Committee have taken the opportunity to test the strength of other materials, viz:—Bricks, cements, slate, stones, marble, and woods, the comparative results of which, they hope when finished, will prove interesting to the Institute. Some startling questions present themselves on this topic:—How is it that all at once we find out, that none of our natural stones in common use are fit for construction, but liable to rapid decay? How is it that it should be assumed to be more economical to go through the process of manufacture, and to transport the object to the work at a less cost than the natural stone itself? Why is it that the best beds of Bath, the most enduring of Portland, such as Sir Christopher Wren used at St. Paul's, cannot be extracted from the quarry and conveyed to London at less expense than the artificial product? Are we prepared to put up with the dingy opaque and unartistic effect of the artificial stone, when the varied tints and the transparent tones give so great a charm to the natural material in buildings? Are we sure of their permanence?

You are aware, Gentlemen, that a considerable body of admirers of the late Mr. A. K. Welby Pugin, anxious to mark their respect for his memory, and for the eminent services he had rendered in the revival and just appreciation of Mediæval art, entered into a subscription and raised a sum amounting to about £1000. After much deliberation and the due consideration of a variety of proposals, as to the best manner of carrying out this intention, it has been at length decided to realise a wish, expressed many years ago by Mr. W. Pugin, to found an endowment out of the annual dividends or proceeds arising from this principal sum, and to apply them yearly to assist a well qualified student to travel for not less than eight weeks in the United Kingdom of England and Ireland, for the purpose of studying Mediæval architecture in Great Britain, whether in ancient or modern buildings: no person, who has once held the studentship being eligible for re-election. In the first year the election is proposed to be made by four certain members of the Committee of Subscribers and five Fellows of the Institute. In subsequent years it will be by a Committee of nine Fellows of the Institute to be named by the Council. A declaration of trust is proposed to be made, placing the control of the said fund under certain regulations in the Council of the Institute for ever. A draft declaration of trust has been prepared by the Committee of Subscribers and submitted to the Council, and will soon be brought before the Members for their consideration and adoption.

Since the closing meeting in June, the concluding part of the volume of Sessional Papers, termed the Transactions of the Institute for the year 1862-3, has been issued. I feel assured that the Members must be satisfied with the series of papers, both on account of the importance, variety, and treatment of the subjects, and the discussions to which they gave rise, and the illustrations which accompany them. It would be difficult to quote the publication of any scientific body with which this may not be favorably compared,—the names of the authors, and the useful nature of the information contributed, are alike favorable to the Institute, whether treating on matters of taste, discussing questions of science, or describing the buildings and monuments of ancient or modern times, the abstruse topics of archæological research, or the practical ones of structural appliances,—they have been carefully brought before the Institute, and as thoughtfully considered by the Members.

It will be our duty to contribute such papers for the Session, which opens on this Evening, as shall maintain the high standard of the last. There can be no excuse for any member, however immersed he may be in the duties of his profession, to neglect the claim which the Institute has on his active co-operation. When we see such men in high position as Lord Derby addressing the Collegiate body of Liverpool in an elaborate and eloquent speech on education; when we see the Bishop of Oxford, charged with the care of all the Churches of his Diocese, distributing in Brighton the prizes to the successful competitors in the Oxford examination, and closing the proceedings with an address, replete with wisdom, brilliant in thoughts and language; when we see a Secretary of State and a Chancellor of the Exchequer producing elaborate works and making masterly speeches on general topics of art and science, even amidst the overwhelming duties of their arduous political life, is it too much, you will surely pardon me if I ask, to expect of our Members their contributions to the papers, which shall give interest to our meetings and add to the stock of our every-day experiences! I pray you therefore, Gentlemen, to give your names to the Secretaries as soon as possible, and the titles of the subjects you propose to consider.

Another circumstance for me to record, connected rather, perhaps, with the social than the scientific occurrences of our body, has been a banquet at Greenwich in August last, to which Mr. Tite, our late President, was invited. Its object was to mark the success with which he had discharged his duties in the chair, and the advantages derived by the Institute from his Presidency. The Lord Mayor, the Chairman of the Metropolitan Board, and other eminent public men were present on the occasion to do honor to one, who has entitled himself in his public capacity to the esteem and respect of his colleagues. Whether in this room or in the senate—whether in public or in private—Mr. Tite has ever promoted the interests of our body, and conferred on it substantial favors. His name is intimately associated with the position we hold in the face of the country; and to his advocacy in Parliament we are indebted, that the Houses of Lords and Commons have recognised our status, and confided to us duties and functions, which it must be ever our pride faithfully to discharge.

On considering the varied operations of the Institute, to which I have ventured to direct your attention, it is fitting to call to mind that all these could not have been realised, without a great sacrifice of time, attention, thought, and devotion by those, who have had more immediately the charge of the official duties and business of the Institute, I mean our Honorary Secretaries. To their untiring zeal, to their intelligence and business habits, we owe much of the active vitality of our body; and to the courtesy with which they transact our affairs, the goodwill and respect with which the Institute is treated on all sides. To Mr. Hayward we are indebted for the perfect arrangements connected with the last rites paid to our late friend Professor Cockerell, and which elicited unequivocal approval. To Mr. Seddon, with Mr. Hayward and Mr. Nelson, we owe all the success of our other proceedings, and it is well we should remember that these arduous duties are not the mere pleasurable occupations of an idle life of men of leisure, but precious moments, hours and days stolen from absorbing professional avocations. They are sacrifices of self to the public good of the Institute and its Members. For they have to conduct all our proceedings, provide papers for our meetings, carefully husband our finances, revise and publish our transactions, cherish in us a spirit of interest and devotion to the Institute, conciliate our co-operation in their efforts, maintain our correspondence with our Foreign Brethren, and keep us all in good humour from the President down to the youngest Student. It is for such services, I am sure you will concur with me, that our heartiest acknowledgments are due to those gentlemen.

In conclusion, Gentlemen, I would observe, that all Art is a magic power. It is beyond the ken of human cunning. It is an instinct—an innate principle of fervid imagination: be its workings slow, laborious, like those of a Rousseau or a Byron, or glowing and ready like those of a Michaelangelo or a Vanbrugh, still it is the same divine gift; with some it is on the very surface, with others deeper seated, and only to be realized by immense toil. However powerful Poetry, Music, Painting, or Sculpture may be, as arresting the attention, fascinating one's faculties of thought or reason, speaking with a thrill to every emotion, pleasing, teaching, ennobling, yet Architecture by other means and by instruments the most rude, is at once more necessary to man, and still more absorbs his feelings and his admiration. Out of the crudest materials and mis-shapen masses she creates pile upon pile—gives them a grace not their own—combines them with a skill at which the most scientific are lost in wonder. Her monuments, under the accumulations of centuries or overgrown with creepers and lichens, employ the learned to explore their origin and destination. In them they discover unthought of secrets of past times—graces in their proportions, beauty in their ornaments, and hidden art in their paintings. They may reveal a nation *long since forgotten or before known only by name.* Architecture enriches the desert, as at Palmyra, with vistas of continuous colonnades and splendid palaces, and offers a halting place of safety to the weary traveller, security to the wealth of commerce. On the bare rock she raises piles of vast magnificence and fanes of matchless beauty, in whose very fractured stones successive races seek for a hidden law of beauty, an inspiration to enable them to revive the truest aim of art—nature's most exquisite transcript. Who is there, that wanders among the stately ruins of the Athenian Acropolis or the sublime memorials of the Roman Forum, and does not envy the glory of those past ages of classic art? Who can contemplate those traditions and mysterious sublimities of the creation of the middle ages, and does not feel his heart throb with powerful emotion? Who does not dwell with delight upon the works of that race of Merchant Princes, who upon the shifting sands of the water-covered lagunes could rear up those stately piles, which bear the names of the Grimani, Balbi, Vendramini, Foscari, and bid wood, stone, brick and marble speak with stirring effect to those, who have eyes to see and taste to appreciate: men who with fierce republican pride might have challenged cardinals, princes, popes, and kings and emperors to produce nobler realities out of fiction? The Architect it is, who with his pencil and compass, with a mind full of deep things, under God's providence and with his brave heart, creates all this and toils on unheeded, often misunderstood, frequently blamed, rarely encouraged except by his own bright star of hope and faith. Let us then work on with the consciousness of something within us, which may sooner or later, before or when in the grave, be at length understood, admired, honored by our fellow man.

THOS. L. DONALDSON, PRESIDENT.

MR. GEORGE GILBERT SCOTT, Fellow, said before the business of the evening was formally closed the least they could do was to express their thanks to the President for the very eloquent, spirit-stirring and encouraging address which he had given them this evening, and was glad to think that the same would be published and circulated amongst the members in the Transactions. He would not attempt to follow the President in the different subjects he had adverted to, nor to dilute with his poor words the eloquence and perspicuity with which he had enumerated the many subjects which called for their attention at the commencement of this session. He would select, however, one subject which he thought was a peculiarly practical one, viz. the remarks of the President on the absolute dearth of Architectural Education in this country. It was true the system of practical education of the young architect followed in this country was on the whole the most healthful one, viz. the system of learning their profession by working with their masters. So far as that went they were in the right road; but they nevertheless knew that what was learnt in an architect's office was not the *high art* of his profession. He learnt the routine of business, the technical working out of the designs of his master, and a great many other things which it was necessary for him to know; and he learnt them better than could be done in any other way; but the *high art* of his profession he could only pick up accidentally, and in a very minor degree, in his master's office; and if he wanted to improve himself beyond what he learnt there, he could only do so by chance opportunities, which he had to look out for on his own account. He believed it to be the duty of this Institute to take this subject into its most serious consideration. He believed it was being taken into consideration by the junior society,—the Architectural Association: but besides these and all the other Architectural Societies, there was one Institution in particular whose duty it was to offer to the Students of Architecture instruction in those connecting links which united Architecture with the two sister Arts: He referred to the *Royal Academy.*

Hitherto, he believed, it had been impossible for the Royal Academy to do it. They had never had above half space enough, and little more than half the year, in which they could offer instruction to their students, and therefore he believed it had been with difficulty they had been able to carry on in any degree satisfactorily the schools even of painting and sculpture. He believed they would be desirous to remedy that defect, if space (as they now hoped would be the case) were given. But his particular reason for adverting to this subject on the present occasion was—not to proclaim the deficiencies of a great Institution to which he had the honor to belong, but to call attention to this remarkable fact: that though no inconsistency could be more manifest, than that a Society formed to promote the three sister arts of Painting, Sculpture and Architecture, and which invites students in all these arts, should refuse all instruction to the students of one of them; though nothing could be more manifest than the absurdity of having schools for *two* of those arts and none for the third;—yet, in the face of all this, a commission of seven noblemen and gentlemen of the highest position in the country had been sitting for months enquiring into the deficiencies of the Royal Academy; they had received the evidence of witnesses of all classes, many of whom pointed out this manifest defect; and—in the face of all this—so little was their appreciation of our own branch of art, that they had made an elaborate report without giving to this subject *one single word of notice* or allusion!!! He called attention to this as a proof of the degree of consideration which architecture received in this country, at the hands of those from whom it had a right to expect the very highest appreciation.

Mr. DIGBY WYATT cordially seconded the proposition of a vote of thanks to the President for his address, particularly because to the stimulus of his eloquent exhortations, the respected President had added, and was continually adding, the yet more powerful one of his example. When they saw one with so many demands upon his time and energies giviug so much thought to the subjects which most affected their professional interests, and watching with almost parental solicitude over the good progress of the art it was their privilege to practice, it gave a lesson, and set a model alike to young and old, worthy of all imitation, and one which he hoped would not be lost upon either.

THE PRESIDENT in acknowledging the compliment said his few words had fallen short of what he wished to submit as worthy of the occasion, but he was much obliged to them for the kind way in which they had received his remarks.

SOME ACCOUNT OF THE PROFESSIONAL LIFE AND CHARACTER OF THE LATE PROFESSOR C. R. COCKERELL, R.A., FELLOW, AND LATE PRESIDENT R.I.B.A.

By **SYDNEY SMIRKE**, R.A., Fellow.

Read at the Ordinary General Meeting of the Royal Institute of British Architects, November 16, 1863.

I have been much flattered by an invitation to address to you a Memoir of our departed colleague. I accept that invitation with pleasure, for I could hardly apply myself to a more grateful subject; yet I enter upon it with many misgivings. I greatly doubt my power to do justice to the subject. The mere outlines of the leading facts of his life I have, of course, abundant means of drawing, but to fill up those outlines adequately and justly needs an abler pencil than mine. Perhaps some future biographer of adequate powers may be induced to fulfil this task. In the mean time, I feel that I should be wanting in my duty to the Institute were I to shrink from the attempt, at least, to sketch the more striking lineaments of his character, to point your attention to his more important works, and generally to convey to you, and to those who may follow us, some idea of the career of this artist, who was so great an ornament and honor to our profession. Biography appears to me to be one of the most agreeable, as well as one of the most profitable exercises of the mind. It is *agreeable* to trace the progress of talent and character from their earliest germination to their full development; to mark the genial effects of early cultivation, and the refining effects of experience and observation; whilst it is *profitable*, inasmuch as this study of a man's career furnishes us with an excellent practical guide for our own course, and for the course of those whose future we may wish to influence or direct. To undertake a biographical sketch, therefore, is, I am pleased to think, a really good work, and I enter upon it, although fully conscious, as I have already admitted, of all my inability, yet with a hearty and earnest desire to do my best.

Charles Robert was the second son of Samuel Pepys Cockerell, himself an eminent member, also, of our profession, whose practice was general, but whom circumstances chanced to lead especially to engage himself as Surveyor in the management of various important building estates. He was a gentleman of great judgment and probity, and his professional course was most successful. Charles Robert was born in London, in 1788. His earliest education was received at a private school, from which, at the age of fourteen, he was removed to Westminster School, where he remained until he was between sixteen and seventeen years of age, when he entered his father's office in order to lay the foundation of professional knowledge. Here he remained for four or five years, during which time his diligence enabled him to become an accomplished draftsman. The elder Mr. Cockerell and my father had been long on friendly terms, and it was natural that young Cockerell should be early introduced to my brother, Sir Robert, at that time rising into eminence in his profession. In A.D. 1809, the task of erecting a new Covent Garden Theatre devolved on him, and young Cockerell, then about twenty-one years of age, feeling great interest in the work, assisted and zealously laboured with him throughout the progress of it. It was certainly an arduous work: in the present age of great contractors and slovenly workmanship, we can hardly appreciate the extreme difficulty that must then have been experienced in getting this enormous and most solid work completed in ten months.

It was in May, 1810, that Robert Cockerell commenced a long course of professional study on the Continent—a course attended with very brilliant results. His accomplished mind, and lively, agreeable manners, soon brought him many friends, but he had the good sense to seek out especially the friendship of ardent fellow-labourers of congenial tastes and pursuits, such as Baron Haller, Stackelberg, Linkh, and Chev. Brönstedt, men whose names have since become familiar to all engaged in the cultivation of classic art. I will not here enumerate his archæological labors: to these I shall shortly advert. For about eight years Robert Cockerell was absent from England, during which time he twice thoroughly explored Greece—both on the Continent and among the Islands—so glorious in the History of Philosophy and Art. For the greater part of the year 1812, he was engaged on the remains of ancient Sicilian architecture, and three years he gave to Italy. He returned home, in 1817, to receive the applause and congratulations of many friends; and it was then he entered on the path of real professional life. Such are the brief outlines of Mr. Cockerell's earlier career—a career which has been prolonged, not, indeed, to the length which his sorrowing friends would have desired, yet long enough to enable him to establish for himself a permanent position among the worthies of our profession.

I will proceed now to enumerate some of the more material works upon which his talents were bestowed. It may be, probably, that his highest distinction—that which has established for him an European reputation—was due to his Archæological labors, but it behoves us first to regard him simply in the character of an architect. You will have observed that his antiquarian researches occupied a considerable portion of his most valuable earlier life—a more considerable portion, perhaps, than would have been expedient, had it been the sole mission of his professional life to erect buildings. For some years after his return to England, it was a labor of love which occupied his chief attention, to digest and work out the results of his antiquarian researches. Still his fine taste soon procured for him professional employment. Among his earlier works may be named the Literary and Philosophical Institution, in Bristol—a view of which he exhibited at the Royal Academy in 1821. This work was rendered difficult, both æsthetically and practically, by the extreme declivity of Park Street, in which it was erected. The design is plain, for the available building funds were very moderate, but it is marked by that delicacy and purity of detail which have characterised all his works. Shortly after this he was employed by the late Marquis of Lansdowne, in adding to the mansion at Bowood, and by other patrons of art. The formation of the new street leading from Portland Place to Pall Mall, about this time, afforded a great opportunity for architectural display, which was scarcely so productive of meritorious examples of street architecture as it ought to have been. But it contains one or two good works, one of which was Mr. Cockerell's, namely, Hanover Chapel, in the parish of St. George's. This work attracted much attention at the time, from its originality of design, and Mr. Cockerell paid the utmost attention to all the minutest details. The feeling did not then exist which regards Gothic as the only style suitable to Ecclesiastical architecture, and Hanover Chapel found, at that period, many more admirers than it would find now. Fashion is proverbially changeful, whether in the builder's work or in that of the mantua maker. Although the changes may not, in both cases, follow each other in equally rapid succession, yet the law of change is universal. The most despotic arbiter of taste cannot stay the fluctuations of fashion. When Mr. Cockerell was entering the world of art, there was a perfect furor for Greek art, and young ladies, intent on needlework, would endeavour to catch inspiration from his sketch books. That taste waned, and inspiration was then to be sought among the picturesque remains of French renaissance: buildings were looked at with admiring favor which had before been regarded as grotesque and barbarous, and old books were sought for, with eager curiosity, which had been previously valued as waste paper. I believe our noble first President contributed largely, by his example to promote this last-mentioned, short-lived, taste: but it was soon to be eclipsed by the rising glory of Gothic art—a glory which will, probably, retain its hold on public favor for some years to come.

Mr. Cockerell's pencil took a higher flight when he designed the National Monument in Edinburgh—a noble Walhalla which will never be completed. The same fate attended the Cambridge University

Library, of which one wing only has ever been completed. In 1832 the building so familiar to most of us, in the Strand, was erected by him, for the Westminster Insurance Company. His appointment as surveyor to the Bank of England, opened out to him a wider field than he had yet enjoyed, for practically realising his æsthetic views. The Dividend Office was one of his most pleasing compositions, although in obedience to the law of change, to which I have adverted, the whole has been since utterly obliterated. The Taylor and Randolph building at Oxford must now be named, bearing date about 1841. Although open perhaps to some criticism, this building has high claims to our attention. It is unquestionably a work of great elegance, and of especial beauty in its details. Like others of Mr. Cockerell's designs, it is marked by the peculiarity that the principal order is surmounted by an upper story, not a superimposed order, nor yet an attic, but yet of so considerable a height as to impair, in some degree, the value of the order below. On this upper story is a cornice of large dimensions, Mr. Cockerell, no doubt, feeling that a cornice is the natural crowning feature of any building; thus there are two parallel cornices rivalling each other in importance, and producing an effect on which some difference of opinion may be expected. This building is, nevertheless, an honorable monument of its author's graceful style, and of his extreme carefulness of detail; every portion of it, internally and externally, having evidently been very elaborately studied. If there is a class of critics who seek to depreciate this building, by calling it a "Pagan" one; it may be replied that the same designation applies equally to the Elgin Marbles, as well as to the compositions of Horace, Virgil, and the tragic poets of antiquity.

The London and Westminster Fire Office, and the Sun Fire Office, are both familiar to every resident in London: the former is especially original in its treatment, and well deserves study, for it is very certain that careful study was bestowed upon it by its accomplished author. I should, however, observe, that this work was the joint production of Mr. Cockerell and of our late distinguished President.

I should have stated earlier that so far back as the year 1819 he was appointed Surveyor to St. Paul's Cathedral. This honorable post he held during the greater part of his professional life, and the intimate knowledge which he thus of course obtained of that wonderful building and the habit he had acquired of studying it both in its conception and construction, had engendered in his mind the profoundest reverence for its great architect.

On the death of Mr. Basevi, in 1845, the Fitzwilliam Museum, at Cambridge, was placed in Mr. Cockerell's hands for completion, and much of the interior finishings of that building are from his design. I have already named the University Library in the same town. That work was the cause of great disquiet to him, for it was not without years of tedious and anxious competition, and endless literary litigation, that he obtained this important commission. The death of Mr. Elmes, in 1851, led to Mr. Cockerell's appointment to complete St. George's Hall, in Liverpool. The exterior of this very noble building was mainly completed at that period, but the interior finishings were the work of Mr. Cockerell, and anxiously occupied him during four or five years. Every one who has seen the interior of that fine Hall will have come away charmed with its artistic elegance; and if there is any portion of the exterior accessories with which he is dissatisfied, it is due to the memory of our friend to record that those exterior accessories are a monument of the unmitigated evil of lay interference. I need scarcely remind you, of what is so generally known, that the sculpture in the tympanum of this building, which was ably executed by Mr. Nichol, was designed by Mr. Cockerell, and is one among many evidences of his refined knowledge of design in the sister art.*

I have now told you of his earlier career, and have named, as briefly as I could, some of the most conspicuous works on which his long and laborious life was engaged. It is needless, perhaps, that I should enter into details of less moment. It remains, however, for me to enumerate the various honors which have attended his course. In 1829 he was elected an Associate of the Royal Academy; in 1833 he succeeded Soane as Architect to the Bank of England; in 1836 he became full Member of the Royal Academy, and in 1840 he was appointed Professor of Architecture in that Academy, which post he held till 1857, greatly to the benefit of the Students. As President of this Institute, in the years 1860-1, and as the first to receive the honor of Her Majesty's Gold Medal, his name will ever stand on our records as one of our most honored and respected members. Nor were his high merits less readily acknowledged on the Continent. He was Chevalier of the Legion of Honor, and one of the eight Foreign Associates of the Academie des Beaux Arts of France. He was elected member also of St. Luke's, at Rome; of the Royal Academies of Bavaria, Belgium and Denmark; of the Academies of Geneva and Genoa; of the Archæological Society of Athens, and of the American Institute of Architecture.

---

* A facsimile of the original sketch for this work is published with this paper, by the kind permission of Mr. F. P. Cockerell.

I hasten now to invite your attention, and doubtless your admiration, to the valuable legacy of beautiful drawings which Mr. Cockerell left behind him. Of these, through the kindness of friends, and the zeal of the Secretaries, an ample and most interesting collection is presented to your view this evening. A critical notice of them now, I am sure you will admit to be out of place. I am not addressing tyros, to whom the beauty of these works has to be explained. You will admire the breadth of light and shadow which distinguishes his pencil, whether in the treatment of slight sketches, such as those made to explain to His late Royal Highness his suggestions for the disposition of the ground at Kensington, or in his more highly finished drawings. You will be pleased, too, with the delicate feeling and extreme beauty which distinguish all his designs for ornament. But these purely æsthetic merits it does not become me to dwell on when addressing you. I will limit myself to saying, that I trust the exhibition of so great artistic excellence will have a powerful and lasting effect on the studies of the rising generation of Architects. Let it not, however, be supposed that I would encourage the notion, commonly prevailing outside the profession, which regards excellence in drawing as the only essential qualification of an Architect. The Architect has very, *very* much to learn besides drawing, although certainly all that he learns will be of infinitely greater avail to him if the accomplishment of fine artistic drawing be superadded. I believe that much of the impotency of architectural design which marks the close of the last century in England, is due mainly to the prevalent absence of education in this respect among the architects of that period; for where there is little facility of drawing there can be little originality of design. In the beautiful restorations that are exhibited to-night, we see how admirably Mr. Cockerell combined the archæologist and the artist. No mere archæologist could have restored to life with so much success the mutilated remains of antique art; neither could any artist have hoped to accomplish so much, if he did not possess a profound knowledge of archæology. It is, I think, to the happy union of these high qualifications, together with his pains-taking and conscientious habits, that Mr. Cockerell was indebted for the eminent position he held as an expounder and illustrator of Greek archæology.

Let me now shortly advert to his great services in this last-named branch of science. His earliest triumphs were the discovery which he made, in company with several other distinguished travellers, of the Æginetan sculptures, and the frieze of the Temple of Apollo at Phigalia. Both these enterprises were accomplished in the year 1811, without any aid from Government, and at a time when the disturbed and lawless state of Greece made such pursuits extremely perilous. That this country should have failed to become the possessor of both these treasures is a matter ever deeply to be deplored. It may be worth while to detain you for a few minutes in mentioning the circumstances of this most unfortunate failure, circumstances which, I am sorry to say, reflect discredit on some of the parties implicated in the trans-action, though certainly none whatever on our own countrymen. It appears that by amicable arrangement among the discoverers, the sale of these marbles was placed in the hands of M. Gropius, the Austrian Consul, who united in himself the qualifications of an artist and a merchant, pending the question as to who should become the possessor. M. Gropius resided at Zante, but as that island was threatened with an immediate attack by the French, it was deemed expedient that the marbles should, for safety sake, be transferred to Malta. The Governments of England and of Bavaria both declared their desire to purchase, and whilst, on the part of the latter, M. Wagner was sent from Rome to bid, Mr. Taylor Coombe was instructed on the part of the British Government to attend the sale, and without fail to outbid his rival, for the Government were laudably anxious to have these treasures brought to the British Museum. The agents set out, but unfortunately the place of sale had not been defined with sufficient distinctness. M. Wagner proceeded straight to M. Gropius, at Zante, whilst Mr. Coombe went to the marbles themselves at Malta. While these agents were thus apart, the sale was effected by M. Gropius at Zante, at the time appointed, but without the benefit of competition, M. Wagner being alone in the market: the marbles were knocked down to him, of course, *nemine contradicente*, and I suppose at his own price. Had the result been otherwise, and had these remarkably fine examples of archaic art found a home in England, I think that one happy result, at least, would have been that sculptors would now have been enabled to study these models in the state in which the touch of time had left them, and not in that to which Thorwaldsen has brought them. I know little of the facts relating to the treatment of these marbles, except what a pretty close and careful inspection of them at Munich has taught me; but when we reflect that these broken and weather-worn fragments were disinterred after lying two thousand years thrown together in a heap, probably by an earthquake, and had to be packed on mule-back and carried over the mountains to the coast, and afterwards shipped to Malta, thence to be transferred by both sea and land to Munich, it appears nothing less than miraculous that we should behold them now as almost perfect statues, without visible fracture or fissure, and with a surface of marvellous perfection!

The scenes of Mr. Cockerell's chief labors in Sicily, were Syracuse and Agrigentum. In the former place he appears by his journal to have resided about three months, chiefly making studies of the Greek fortifications, which extend for miles in tumultuous ruin, over that interesting region. But it was at Agrigentum that he earned his most distinguished laurels. His natural taste for sculpture appears to have led him to take special interest in the fragments of colossal statues at the Temple of Jupiter Olympius, a stupendous building, the largest known temple in existence after that of Diana of Ephesus. Mr. Cockerell was the first to put them together, and to explain their purpose. Don Raffaelle Politi, still, as then, resident in Girgente, near the ancient City, had conceived that these colossi might have formed a sort of door post at the entrance of the Temple, but Mr. Cockerell proved them to be caryatides, forming an upper, interior, order or attic, and supporting the main timbers of the roof, as explained by the engravings in the supplemental volume to Stuart's work. Many years after Cockerell's visit, I found the Colossus still on its back, as he had placed it; and probably to this day it so remains, for the whole country has been dormant, until, indeed, recent political revolutions have proved that life is not extinct.

It would detain you too long to narrate the particulars of his second visit to Greece, during the years 1813 and 1814. In the first-named year he visited Canada. He made numerous sketches and studies during a tour of the seven Churches of Asia Minor, visiting Sardis, Laodicea, Philadelphia, &c. At the first-named place he was the first to take accurate dimensions of the Temple of Cybele. Towards the end of 1814 we find him in Italy, where he remained for three years, until his return to England in 1817. His agreeable manners, his artistic knowledge, and above all his ardent love and assiduous study of art, made him many friends in that land of art. At Naples, Pompeii, and at Rome, he found a rich harvest for his pencil; and when at the former place, eleven years afterwards, I found the memory of him still green among his fellow artists and admirers.

It was during a long stay that he made at Florence that he conceived the pedimental disposition of the Niobe group, which was at once received with great favor by Continental artists and archæologists, and was generally adopted by them. I believe that doubts have recently been entertained, by some of high authority, with respect to his design for the restoration of this group, although all, with one voice, admit its ingenuity. I will not here dwell on the singular beauty of Mr. Cockerell's restorations of Athens and Rome; they will, we may safely predict, survive the living generation, and never cease to interest the archæologist. His drawing, shewing to one scale all the architectural chef-d'œuvres of the world, and that which he devoted to the illustration of the works of Wren, are presented to you this evening, and are certainly among his most remarkable productions. It is needless, however, to dwell on these works, which are before you. We have not time even to name the various labors of his graceful pen. I cannot, however, refrain from a word or two of admiration of his last great work on the Temples of Ægina and Arcadia, published not much more than two years before his death, and illustrating the labours of his earliest professional years; that volume gives a sort of unity to his life, which cannot but be regarded with peculiar pleasure. "This work," to use the words of my friend, Mr. Charles Newton, an accomplished and most competent critic, "whether we consider the beauty, accuracy, and exquisite finish of the illustrations, the varied learning and profound knowledge of Greek art of the text, or the surpassing interest of the discoveries recorded, is one of the most valuable contributions to archæological knowledge that has appeared in this country. The whole work is pervaded with that fresh and lively enthusiasm, that bold and original conception of the ancient world in all its glory, which distinguished Mr. Cockerell's mind, and made us feel that if he had not been a great architect by profession, he might have embodied in *poetry* his profound sentiment of ancient art."

I believe that I have now sketched out the leading outlines of the life and achievements of this most excellent man. You will, I am sure, concur with me in considering that the present is not a fitting occasion to go into the minor details of his exemplary life, or to analyze the character of his art. Through the kindness of his family I might have laid open to you the very penetralia of his mind, and I am satisfied that the more intimately you became acquainted with him, the more highly you would esteem him; but the brevity which I think the occasion imposes on me, forbids my dwelling on the more delicate traits of his character; the kindliness of his disposition; the warmth and generosity of his heart. I would tell you how he labored for many years in furtherance of the Artists' Benevolent Society, and how deep an interest he felt, how active a part he took, in laying the foundation of the Architects' Benevolent Society; but all these are details which we must not enter upon to night.

If we stand back, as it were, and view his character as a whole, regarding only its salient and conspicuous points, we shall see that refinement of mind was perhaps his most marked characteristic; a delicate and fastidious discrimination was perceptible, not only in his professional works, but equally in his life and manners. It was perceptible in all he said and wrote, as well as in all he did. It influenced his feelings as well as his expressions. Who, among all who best knew him, can call to mind a single instance of ill-breeding? Nothing low or illiberal ever found harbor in his breast. A coarse expression of opinion never escaped his lips: a coarse idea never seemed to enter his head. He could condemn a delinquent, and that too in words of no ordinary force, but his condemnation was never tinctured with coarseness or abuse. We meet often enough with men who quite revel in invective, and who, if they fall upon an unfortunate offender, do not stop to weigh or measure his guilt, or to make allowance for redeeming or palliating circumstances, but will crush, tear, and shake the culprit to pieces with unflinching ferocity. Very far indeed from this was the habit and disposition of our friend. There was no bitterness whatever in his nature; he knew how to condemn, but he knew not how to vilify or vituperate. No one, it is true, felt more sensibly a mean or sordid action; he really loathed and abhorred it, and would resolutely turn away from, and utterly reject its author: but for the merely foolish man, or vain man, or the thoughtless or wrong-headed man, or peevish, ill-tempered man, all these he would smile at, but would as readily pardon.

Perhaps, however, there is no point in his moral character which shines out with more peculiar lustre than his sincere, constant, never-failing, never-changing friendship. How many there are that can bear testimony to this! Is there anyone, with whom he has been on terms of friendship, who can say that he was ever abandoned or neglected by him? We need no better proof of this, than the fact that very few ever had so numerous a band of fast friends. He had the power of attaching others to him, because they saw that he was honest and sincere in his friendship towards them.

So much have I said of his refinement of mind, as visible in his social demeanour and conduct. But I must not omit one other pleasing trait. We live in an age of the keenest competition. Johnson has compared the course of human life to a river, upon the surface of which a thousand barks are seen scudding before the wind. Some get stranded and lost upon shoals: some, driven by the impetuosity of their heedless, headstrong, course, are shattered against the rocks and sink: some are lost in whirlpools, which they might have avoided had they wisely looked ahead: some sink foundered, through the mere negligence or fatuity of the occupant: but hundreds of these little vessels are seen to perish from the injuries mutually inflicted on each other, by running an overbearing, selfish course, and fancying that they can best ensure the uninterrupted security of their own course by running down their neighbour. Such is human life as depicted by the great moralist, and such, too, is the type of each separate channel through which the tide of human life is running. Our own profession is itself as a river teeming with busy life; it requires very careful steering to keep a vessel on the even tenor of its way, however anxious the steersman may be not to inpinge upon his fellow voyagers. But see what conflict and confusion ensue when reckless steersmen do not keep that object in view! What discords arise! What evil passions are bred! What unhappiness results! But no such steersman was our late friend. I am pretty well acquainted with the whole course of his life, and I know not one instance when his high principle forsook him: not one instance of his having insidiously shouldered out a colleague, or of his attempting, by guile or finesse, to supersede a brother artist. In short, he was a gentleman in the largest sense of the word. He has left behind him an example of the highest value to all who, now or hereafter, may have a mind capable of fully appreciating him. He has shewn that a man's whole life may be absorbed in the pursuits of his profession, and yet he may retain to the last the most liberal and catholic views of it. He has, indeed, nobly vindicated that attribute of the Fine Arts, which has been accorded to them, with so much justice, at all the best periods of the world's history, as purifying, elevating and ennobling the human mind.

Mr. W. TITE, M.P., Fellow, rose and said, the usual motion which followed on occasions like the present, was that of a vote of thanks to the author of the paper which had been read; and he was quite sure he expressed the universal feeling in the room of grateful thanks to Mr. Smirke for the character of the paper itself, for the great pains he had taken with it, and for what he had told them of their deceased friend. But he himself rose for two special reasons—first, to state his great regret that, owing to ill health, he was unable to attend the funeral of his late friend; and, in the next place, that for a long period of his life he not only possessed the friendship of Mr. Cockerell, but that on some occasions he had had the advantage and pleasure of working with him. His friend Mr. Smirke had adverted to one incident which led to that association, as joint architects of a large public building, and which he hoped would be considered creditable to both. It was this—The London and Westminster Bank, then a rising and important establishment, wished to build new bank premises. The directors did not desire competition, as was the fashion of the day. At the same time there were, in truth, two architects in competition, viz., the late Mr. Cockerell and himself, and each had excellent friends upon the direction, who were severally desirous that their friend should be entrusted with the erection of the building. It occurred to him (Mr. Tite) that it was a most unworthy strife for two men, so placed, to be engaged in; and he submitted to Mr. Cockerell the proposition, whether he did not think they could act as joint architects, and so put an end to the contest. The reply of Mr. Cockerell was, that it would give him the greatest satisfaction to do so; and that if he (Mr. Tite) would propose the arrangement to his supporters, he (Mr. Cockerell) would take the same course. The arrangement was readily adopted by the directors: the work was rapidly completed, and in the end they received the compliments of the Board for the way in which it was accomplished. The outside of the building was marked by Mr. Cockerell's hand; the interior was more particularly his (Mr. Tite's). What belonged to him (Mr. Tite) had been much changed; but the characteristic style of architecture of the exterior had been preserved by him in all the extensions of the bank. This was an incident in his life, which he thought it might be well to mention, and thus to avoid personal and professional strife. With regard to the amiable social qualities of Mr. Cockerell, he had the best opportunities of knowing them. His intimacy with him was always marked with the most agreeable connections and associations. He was at all times a most excellent friend—a man of considerable conversational powers, of great learning in his art, and he was respected and esteemed by all who had the honour of his acquaintance. It happened, as well to the late Sir Charles Barry, as to himself (Mr. Tite) that in the two great competitions of their day, Mr. Cockerell was not successful. This incident, so far as he (Mr. Tite) was concerned, seemed to cool Mr. Cockerell's friendship; but it soon grew warm again, and as they grew older, professional differences were forgotten, and they were as good friends as ever. He would remark that he had always been struck with the great skill of Mr. Cockerell as a draughtsman; it was, in his judgment, one of the great secrets of his power. The large drawings of Antient Remains, now before them, showed the wonderful pictorial talent which their late friend possessed: but there was a drawing which he did not see, but which he knew particularly well, and which he once feared very much—that was a design for the new Royal Exchange, with four towers, drawn by Mr. Cockerell's own hand, in pen and ink, in the style of Piranesi, and of greal power and effect.

[The President stated that the drawing alluded to was in the gallery below.]

He (Mr. Tite) saw Mr. Cockerell at work upon it before he himself was engaged in the competition, and he thought, as a work of art in connection with architecture, it was one of the most remarkable he had ever known. Allusion having been made in the paper to Mr. Cockerell's connection with Mr. Elmes in the building of St. George's Hall, at Liverpool, he would remark that, very much to his astonishment, he had recently read in a Liverpool newspaper that Mr. Rawlinson, the engineer, had succeeded Mr. Elmes as the architect of that magnificent building. He had known Mr. Rawlinson for many years as one who had earned distinction in his profession as a civil engineer, and lately as directing public works for the employment of operatives in the Northern districts; but at the time to which he referred, Mr. Rawlinson was a humble man, and, he believed, acted in the capacity of Clerk of the Works to Mr. Elmes, whose distinguished talent they all knew, and a young man for whom he (Mr. Tite) had the greatest regard. Mr. Elmes having succeeded in the competition for that great building—St. George's Hall—was anxious to obtain the help of men of greater experience than himself in carrying it out, and he sought Mr. Cockerell's and his (Mr. Tite's) advice. The information he was able to give was different from that which Mr. Cockerell was consulted upon. He (Mr. Tite) was appealed to on practical questions. Reference was made to Mr. Cockerell on other points. On one occasion, however, Mr. Cockerell said to him, "Elmes has been asking me whether I think the great hall can be roofed with brick and solid materials, instead of wood?" He (Mr. Tite) replied that he had recently been to Munich, where there was a church roofed with brick, an ellipse of very great span. The crown of the arch was not more than six or eight inches thick, but it stood well and without settlement. He (Mr. Tite) could therefore see no reason why, if that had been successful in Germany, this hall might not be covered in the same way. This opinion was communicated by Mr. Cockerell to Mr. Elmes. Soon after that Mr. Elmes died, and the building passed into the hands of Mr. Cockerell, who was appointed architect. Thus the idea of the brick roof was that of Mr. Elmes, but was carried out by Mr. Cockerell. He strengthened the abutments with piers. Mr. Rawlinson, it was stated, suggested that the bricks should be made specially for the purpose, wedge shaped and hollow, but hollow bricks were, as the meeting well knew, not new in principle. The actual superintendence of the work was placed in the hands of Mr. Rawlinson, which he (Mr. Tite) believed was all that gentleman had to do with the roof in question. Much of this he feared was like an old man's gossip, but by their cheers he was induced to believe the few incidents he had adverted to had interested them, and they might be useful as a guide to others in life; particularly in the learning which Mr. Cockerell brought to bear upon the architecture of periods in the world's history, which he and his friend used to study and admire, but which seemed at the present day to be a little out of fashion. He was not himself aware how Mr. Cockerell succeeded in Gothic architecture; for, although he had erected some buildings in that style, he (Mr. Tite) had not seen them. He should like to know how he succeeded at Harrow. If he was as successful in Gothic as well as in Classic architecture, he must have been a very superior genius; for even Sir Christopher Wren, great as he was in Italian architecture, did not do much for Gothic, which he disparaged. They had sustained a great loss, which he was sure they all felt deeply. A man of talent had passed from them—a man who illustrated their art by his published works, and adorned it by his life and practice. This would naturally lead them back to the point from which he had started, and coming to the resolution he had to propose, he would say that every friend of deceased worth would desire to have no abler biographer, or their lives recorded by a more "honest chronicler" than his friend Mr. Smirke. At the same time he would add, that there was not a word in this memoir to the truth of which they did not all bear witness; and though his friend in his modesty declined to consider himself an eloquent writer, he was certainly a most truthful one. He therefore begged to propose that the sincere thanks of the meeting be given to Mr. Sydney Smirke for the able and interesting memoir of their departed friend.

Mr. G. GILBERT SCOTT, Fellow, in seconding the motion, would not add one word to what Mr. Smirke had so happily and elegantly said of their departed friend, followed by what had been heartily expressed by Mr. Tite, on the same subject, with every word of which he felt sure that every one present must earnestly sympathize. He heartily thanked Mr. Smirke for his paper.

The PRESIDENT said, if for a moment he paused before putting the motion, it was not because he doubted that it would meet with a hearty response from the members present; but it was in order that another eminent member might rise to *second* the motion, and thus serve as an index of the mind and feeling of the Institute on this important occasion. There was an admiration of great men, which had been styled by Carlyle "hero worship," and which has by some been ridiculed. But such an homage was due when it had for its object a man like the late Mr. Cockerell. Allusion had been made to a point in that gentleman's character, which was very striking throughout his professional career, viz., the absence of that selfishness, which would grasp and concentrate to himself every possible advantage. He was a man of generous mind, and wished to distribute the advantages, which arose from the pursuit of a liberal profession. Mr. Tite had referred to the extraordinary skill of Mr. Cockerell as draughtsman, as the secret of his power: whereas he (the President) regarded it rather as an ind of the power, which existed in the mind, and to that he attributed his great success in his professi He now proposed for their unanimous acceptance, that the best thanks of the Institute be given Mr. Sydney Smirke for the elegant and truthful picture he had given them of the life of that admira man, the late Mr. Cockerell.

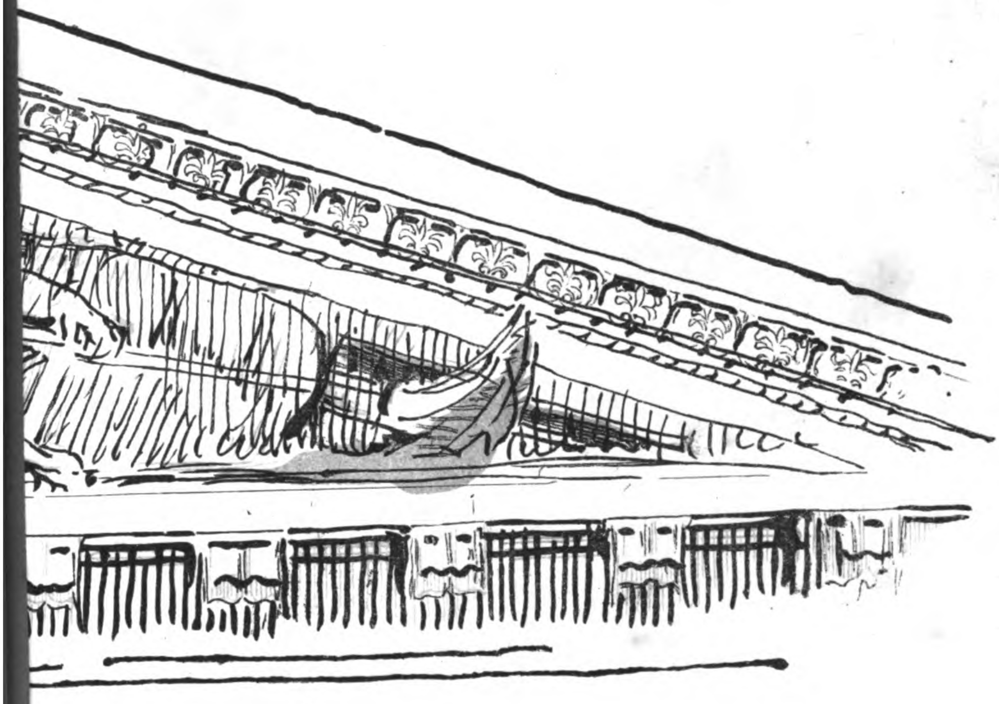
The vote of thanks was passed by acclamation.

Mr. **Gilbert Scott** expressed a hope that the President would thoroughly urge upon the young members of the profession the careful study of the exquisite and wonderful drawings from anci architecture and sculpture exhibited in the room in which they were assembled. The more they we studied by the younger members, the more would they be incited to endeavour to render themselves every sense of the word, *artists*, and might, he trusted, be led to pursue their art with at least so degree of the same ardour as was exhibited by their departed friend.

The **President** was quite sure the remarks of Mr. Scott would come home to all. He th announced that the Council, having been consulted by the Architectural Union Company, as to the di position of accumulated dividends on certain donation shares, had recommended that a premium twenty guineas should be offered for the best model in clay of some architectural subject combini vegetable and animal forms.

ng the Palm branch –
Mercury marshals &
on her bended Knee,
he owes to Her. A River
ams of commerce; &
& warehousing of goods,
which fill up the

C.K.C. fecit.
1843.



CHRONOLOGICAL LIST OF DESIGNS AND DRAWINGS BY THE LATE CHARLES ROBERT COCKERELL, ESQ., R.A.,

Selected to be Exhibited at the Royal Institute of British Architects, November, 1863.

Designs made in Italy for a Palace for the Duke of Wellington. *Plans and Elevations*	1816
Bristol Philosophic Institution. *Plans, Sections and Views*	1818
Harrow School, New Wing, Speech-room, &c. *Plan and Elevations*	1818-1820
View of the Roman Forum, restored*	1819
Mansion at Oakley Park, for the late Hon. Robert Clive. *Plans, Elevations, and Details*	1819-1824
View of the Parthenon at Athens, restored	1820
Hanover Chapel, Regent Street. *Plans, Elevations, Views, and Details*	1821-1824
St. David's College, Llampeter, Cardiganshire. *Plans, Elevations, and Views*	1821-1827
Chapel and Mausoleum at Bowood, erected for Lord Lansdowne	1822
Mansion for Mr. J. L. Naper, at Lough Crew, Ireland. *Plans, Elevations, Views, and Details*	1822-1829
Additions to the Grange, in Hampshire, for Lord Ashburton, New Dining Room, &c.	1823-1825
House at Dery Ormond, for John Jones, Esq.	1824
View of Athens, restored.* *(A companion to that of the Roman Forum)*	1824
National Monument on the Calton Hill, Edinburgh. *This was designed on the model of the Parthenon, at Athens, and of the same size; the porticos and vestibules were adapted to the reception of commemorative statues, and the interior to the purposes of a church*	1825
University College, Gower Street. *Competition design*	1826
Mansion for Mr. Farquharson, at Langton, Dorsetshire. *Plans, Sections, Elevations, and Details*	1827-1833
The Duke of York's Column. *Competition design*	1829
Designs in competition for the Cambridge University Library and Museum, with Mr. Wilkins, Mr. Decimus Burton, and Messrs. Rickman and Hutchinson. This competition partially failed; Mr. Cockerell's designs were highly approved, but Messrs. Rickman and Hutchinson's were chosen in consequence of Mr. C.'s departure from the programme of the Syndicate, who required that the centre of the ground in front, between the Senate House and the fence next to King's College, should fix the axis of the building. Mr. C. made the design, No. 1, partly on that principle; but in the more finished design, No. 2, he took advantage of the width of the site, and filled the ground so as to get the quadrangle nearly 100 ft. square, instead of 100 ft. by 60 ft. as the programme would have made it. This gave rise to many criticisms on Mr. Cockerell's and Mr. Rickman's designs, and a number of pamphlets (which are to be found in the library of the Institute) were issued on the comparative merits of the two, with others by Mr. Wilkins: and, finally, in 1835, the same parties were again invited to compete, and Mr. C. offered his third design, which was chosen, and the North Wing was proceeded with. In the interval of the two competitions the Theatre shewn in designs Nos. 1 and 2, had been executed in another part of the University, so that it was not required in the third design.	1830-1835
Proposed Granite Pedestal for the Warwick Vase, Cambridge	1830-1836
Westminster Life and British Fire Office, in the Strand	1831-1832

---

* Fac-similes of original sketches of these noble drawings will be published in the future parts of the Transactions of the Institute for the present Session.

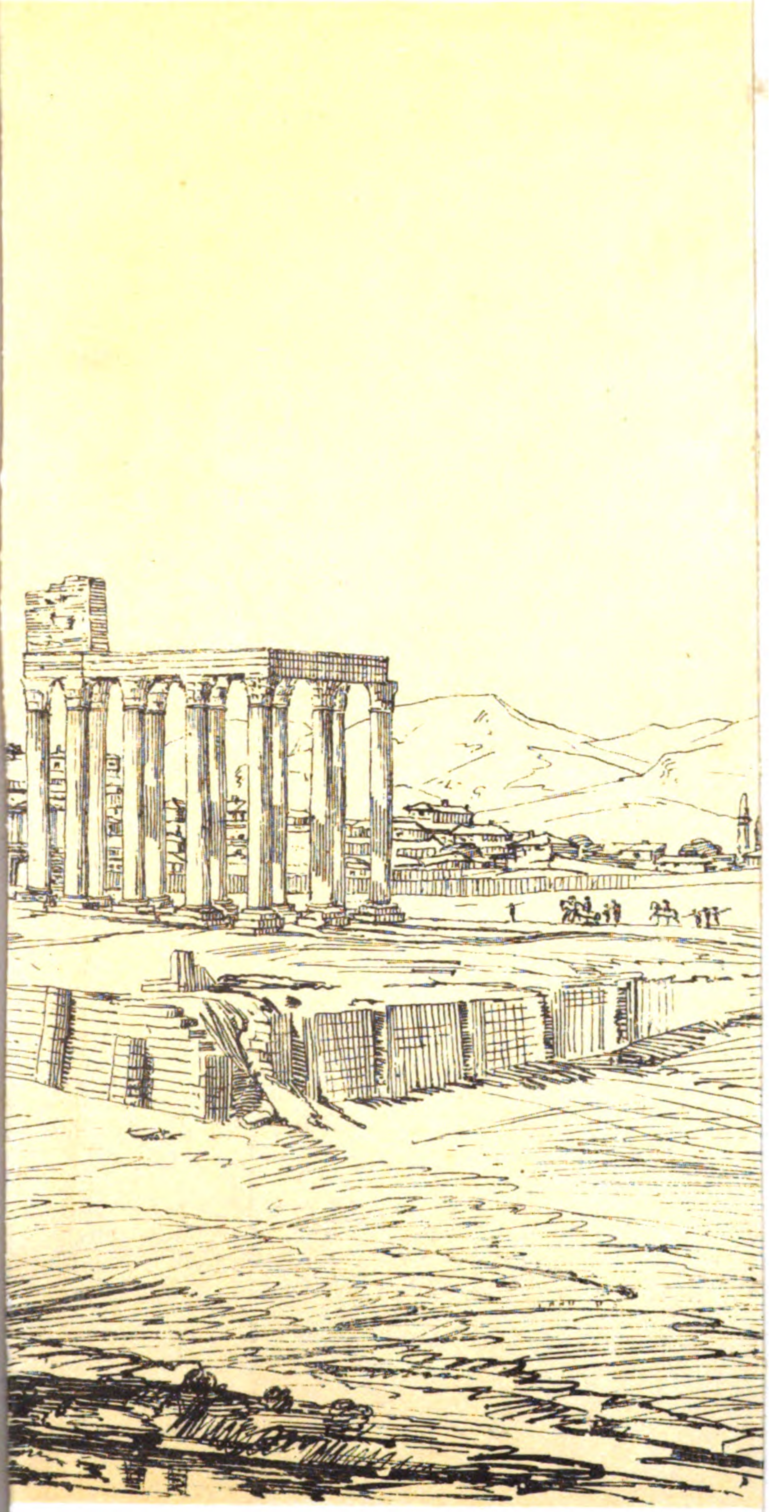
Theatre of Pompeii, restored, as it may have appeared between A.D. 63 and 79	1832
Design for Falkland Palace, for Mr. Bruce, (not executed). *Plans and Elevations*	1833
New Houses of Parliament. *Competition design*	1835
Lithographic View of the Interior of the Dividend Pay Office at the Bank of England, built by Mr. Cockerell. *Afterwards pulled down by him to make way for the present Private Drawing Office*	1835
Four Lithographs of Bassi-relievi, executed by Mr. Rennie for the same	1835
Design for the Houses of Parliament. *(Competition)*	1835-1836
Reform Club, Pall Mall. *Competition design*	1837
London and Westminster Bank, erected under the joint superintendence of Mr. Cockerell and Mr. Tite	1837-1839
Chapel at Killerton, Devonshire, for Sir Tho. Dyke Acland, Bart.	1837-1840
Harrow School Chapel (taken down in the year)	1838
Tribute to the Memory of Sir Christopher Wren	1838
Royal Exchange. *Competition designs*	1840
Sun Fire Office. *The building was begun according to the design No.* 1, *afterwards the City required the Threadneedle Street front to be set back to widen the street, and the angle to be taken off*	1840
Taylor and Randolph Galleries and Library, Oxford. *The drawings on strainers were those sent in competition. Other studies and drawings of the building as executed*	1841-1846
Branch Bank of England at Manchester. *Studies, and Elevation as erected*	1844
Branch Bank of England at Bristol. *Elevation as erected*	1844
Carlton Club, Pall Mall. *Competition design*	1844
Branch Bank of England at Liverpool	1845
Pen and ink sketch of a Pediment for a Public Building. *Mr. H. L. Elmes, the Architect of St. George's Hall at Liverpool, who sought occasional advice from Mr. Cockerell in carrying out his great work, saw this sketch, and recommended it to the Corporation, for the South Portion of the Hall; it was executed as shewn in the lithographed view*[*]	1846
Fitzwilliam Museum, Cambridge; designs for the finishings of the Central Hall, made after the death of Mr. Basevi in the year	1846-1847
The Professor's Dream; a Synopsis of the principal architectural monuments of Ancient and Modern Times	1849
Designs for the Interior of St. George's Hall, at Liverpool, finished by Mr. Cockerell, after the death of Mr. Elmes in 1847. *Views of the Hall, Organ, &c.*	1851-1854
Liverpool and London Insurance Buildings at Liverpool	1855-1858
Restoration of the Mausoleum at Halicarnassus.	1858
Restoration of Pompeian House.—View of the Kiosk of Ali Pacha at Janina.	
Approaches to London Bridge. *Sketch design.*	
Views in Greece.	
Drawings of the Frieze of the Temple of Apollo Epicurius, at Phigaleia. *These sketches were sent to England to be laid before the Government, as an inducement to secure the Marbles for this Country*	
Pediment of the Temple at Ægina—etching. Pencil studies of the sculptured Marbles.	
Sketches of Design made at the desire of the late Prince Consort, for the proposed Galleries and Museum at South Kensington.	

---

[*] A fac-simile of this drawing accompanies this paper.

Kell Bro^{s} Lith

ADE AT ROME IN 1817



THENS.

AT ROME IN 1816.

KS ON

0, 1863.

ınd of its
ing itself
ıay hope
eary you
cretaries,
ll find to
hall take
a more
some of
er of the
f church
o be the
of those
ne great

to urge
ght to be
few who
ords and
ability to

ing, viz.
uth, and
y of the
l observe
, in the
ty to be
suppose
found in

esting in
rding to
lescribed
wooded
onfusion
seen to
stretch

NOTES ON NEWLAND CHURCH, GLOUCESTERSHIRE, WITH REMARKS ON CHURCH RESTORATION AND ARRANGEMENTS.

By WILLIAM WHITE, Fellow.

Read at the Ordinary General Meeting of the Royal Institute of British Architects, November 30, 1863.

I have been asked to give a detailed account of Newland Church, in the Forest of Deane, and of its restoration. To me it is no easy task to frame a sufficiently vivid description either of the building itself or of the work effected. The history of the church, however, is instructive, and at all events I may hope that what I shall be able to bring before you may not be without its interest. But whether I weary you or interest you, the blame or the thanks must be laid upon your zealous and indefatigable Secretaries, who will give one no peace till the duty which they have imposed has been performed. They will find to their dismay that the spirit which they have invoked is more easily raised than allayed, for I shall take the opportunity of enlarging upon certain points of church restoration and arrangement in a more detailed manner than may at first sight seem needful or advisable. Decided as are my views on some of these matters, and strongly as I may express myself, far be it from me to imply a censure either of the persons or the views of those who may be so unfortunate as to differ from me in the matter of church arrangement. But I do, nevertheless, feel bound earnestly to advocate that which I believe to be the life and soul of church architecture, and by all means in my power to promote the diffusion of those principles upon which experience has taught me to place so high a value, and which form one great desire and aim of my life to set forth in a fair and proper light.

I do not profess to be a setter forth of new views, or of views of my own—I only seek to urge upon the notice of such as have not yet fully considered them, a few of the principles which ought to be our guide; and I feel sure that such as have learned their worth will, for the sake even of a few who have not, bear with what may be to them only an old story twice told, but told now in new words and with all the force that can be applied to it by one who feels deeply his desire, but withal his inability to plead for those principles as they deserve.

Having warned you of what is in store I must now turn to the special subject of this evening, viz. my notes upon Newland Church. Newland is situate about four miles S.E. by S. from Monmouth, and about six miles West from Lydney Station. The navigable Wye forms the western boundary of the parish. The Royal Foresters are very jealous of the name of their mother church. You will observe that I do not call it New'lănd. This is the name of a village about thirty miles distant, in the adjoining county of Worcester. But it is New-lând'. I take the origin of this peculiarity to be connected with its attachment till within these few years to the Welch See of Llandaff, and I suppose that its second syllable is properly "Llan" rather than "Land," in spite of its being found in conjunction with the Roman prefix of "New."

The Church of Newland then, dedicated to All Saints, is one of the finest and most interesting in the "Royal Forest." It is the mother church of Coleford, Clerewell and Bream. According to Sir Ric. Atkyns S. Briavel's also was included in the parish anciently. The church has been described as "standing on very elevated ground, overlooking an extensive tract of country in which thickly wooded "slopes, rugged rocks, verdant meads and peaceful vales are thrown together in picturesque confusion "and gorgeous luxuriance. From even almost the lowest valley the heaven directed tower is seen to "over-top the richly timbered heights; while viewed from more elevated positions it seems to stretch "upwards—though the church is not very high—with a lofty grandeur that dwarfs all surrounding "objects." This description though somewhat stilted is hardly exaggerated, and the warm deep grey of the masonry stands out in pleasing and striking contrast with the forest green. Indeed there are very few of our country villages able to boast of so magnificent a church, with so clear and interesting a history. The church appears to have received successive additions almost from its first foundation. It is grand in plan and picturesque in outline. The general plan consists of a fine chancel with an arcade of two on either side separating it from the Gage aisle or chapel on the north and the Dunraven aisle on the south; a large and lofty nave with clerestory, terminated at the west by a grand tower; very broad and masculine north and south aisles separated from the nave by arcades of five. The north aisle is separated by an arch from the Gage aisle. The south aisle is almost continuous with the Dunraven aisle. There is a south porch, by the side of which stands the Probyn aisle, a mortuary chapel connected with the south aisle by an arch of two orders. There was also a large but very poor modern vestry to the north-east.

Having now sketched out a description of the church, I must lay before you a few particulars as to its history, after which I shall endeavour to trace out and connect with its history the architectural features presented by the building itself. I shall then say something of its state before restoration, and give an account of what it has been necessary to do, and of what has been done. I purpose then adding a few words, as I have already intimated, upon the general principles of church restoration which such a church as this are calculated to suggest, together with some remarks upon church arrangement as bearing upon the subject of church architecture.

"There is record of the first building of this church in 20 Henry III. (A.D. 1236). The first "partial endowment of tythes was in the reign of Edward I., a larger one in Edward II., and there was "a grant of estates in Edward III. There is also mention of the rise of a family named Hall, who is "said to have enlarged the church in Henry VII.

"The church originated in a neighbouring hermitage, which again had its rise in the flight of a "British chieftain from the battle of Bangor Iscoed, in Flintshire, in the sixth century. Again, the "conversion of this chieftain was connected with the preceding visit of S. Germain to this country, and "with the foundations left by him, and by some other missionaries from the country about the Loire.

"There was a Welch or Irish tribe in the neighbourhood, afterwards supplanted by a Breton tribe, "and these again by a Norwegian or Danish settlement, and all these traces were crossed by Anglo-"Saxon footsteps, and at last swept over by the Anglo-Normans. Besides this there were unmistakable "traces of Roman settlement." For this information I am indebted to the research and kindness of Mr. Fryer, of Coleford, who may, I hope, be induced some day to give us the result of his investigations as connected with the fragments of other architectural antiquity found in the neighbourhood. It would be interesting to trace the foundation and spread of that spirit which appears to have slumbered so long, working with slow and steady steps, leavening the country with its influence, and at last bursting out into the glow of devotion which called forth from the dust so noble a structure as Newland church; for, as appears sometimes to be the case, the first seed from which this church sprung was sown by strangers in a quiet sequestered spot, free from the haunts of men, to serve for the devotions only of a few religious recluses.

But when this church was built it was planned essentially as a parish church, for the accommodation of large and increasing congregations. It was planned so as to be capable of extension, and it did undergo alteration and great addition within a few years of its foundation. To it flocked, no doubt, the scattered population of Foresters who at that time must have inhabited the neighbourhood in great numbers.

The dedication itself suggests the probability of there having been a Christian community there for many years previously to the building of the church, who were interred, perhaps, in this very spot, and who now were to be remembered by their children's children year by year in Christian commemoration, that so their memorial might be handed down to posterity and form a link in the never ending chain of association. And I do not know a district where all classes, whether churchmen or nonconformists, take the same lively interest as the Foresters do in decking the graves of their dead every year, chiefly on Palm Sunday, with garlands of flowers and evergreens, or take the same uncontrollable pride in their mother church, notwithstanding that their un-endowed villages, or rather towns, have been left to themselves and to unauthorised ministrations till within the last few years. The venerable vicar, who had the happiness of celebrating his parochial year of jubilee by the re-opening of his restored church, appears to have been the first to take any very active step in the many good works that since the commencement of his ministry have been carried on in the now sub-divided parish.

It has been supposed that the original church of Newland was on a very small scale. I can, however, see no indication of this, but, on the contrary, there is every appearance of its having been planned upon an unusual scale of magnificence in size, though so simple in treatment and detail.

The 20 of Henry III. (A.D. 1236) was given in the information I have above quoted as being the date of the first building. But it appears that the crown grant of land for its site is dated 3 of Henry III. (1219) and that grants of oak were made for it in the 5th and 7th of the same reign. It appears that a grant of tythes was made to the Bishop of Llandaff, in the 1st of Edward I., and of lands in the reign of Edward II. to Sir John Wysham, and in the reign of Edward III. to Sir John Joce, to whose memorial I shall presently refer. The hermitage before spoken of was granted away in the 4th of Henry III. as a grange to the Abbey of Grace Dieu in Monmouthshire, and from this time may be said to date the arrangements for the commencement of the church by Robert Wakering, a royal chaplain, aided by Radulphus and Philip, two chaplains from a hermitage at Stow Grange. The extent and exact position of the original building has been much questioned, and of course can be only matter of conjecture. I naturally conclude my own conjecture to be the only right and true one. Some have concluded, I know not why, that it "comprised only what is now the north aisle, with its chancel at the east end." This, however, is impossible; for the north aisle is essentially an aisle complete in itself, it had a window at its east end, the jamb of which still remains, prior to the erection of this eastern chapel. The date of this chapel is therefore later, though probably earlier than that given by Sir R. Atkyns, who speaks of it as founded by Robert Grinder and Joan his wife, in the 24th of Henry VI. (1446). To me it seems very clear that the chancel and the present nave were first built, with preparations made for the subsequent addition of aisles when time and funds, or other circumstances, should allow. The north aisle was accordingly then added; and after this, the south with its porch soon followed. After these came the tower at the west end, late in the same century. For this, also, preparations had been made. The Dunraven aisle followed some fifty years later. It must be observed that no preparation had been made for these chancel aisles; they formed no part of the original plan.

The only other additions were the Gage aisle and the Probyn aisle, in the twenty-fourth year of the reign of Henry VI., at which time also the chancel underwent considerable rebuilding. The clerestory must have been added about A.D. 1600 or later, when also a few other minor alterations were effected. But the roofs generally must have been renewed from time to time about this period, following to some extent the more ancient forms.

I have given a consecutive sketch of the architectural history of the church, rather than break in upon my narrative with proofs or indications of the respective alterations and additions. It is now necessary to support what I have advanced by the architectural evidences, which appear so far as I can see satisfactory and conclusive; my only fear is that I may be unable to make the explanation so clear to others as it is to myself.

There is nothing in the chancel to which we can definitely point as being a portion of the original structure. But we know that a nave would not have been built in those ages without a chancel. The indications of earliest character are in the nave arcades. But in taking down the east gable of the chancel the portions of a sill were discovered, evidently belonging to a window of early date, although there was nothing to define what that date was. We come therefore to the nave arcades. Now the church appears to have been fifteen years in *commencing* after the site was given, and a grant of oaks made for its erection. Time was thus allowed for cutting and seasoning the oak. And the work was probably carried on by only a limited number of local artificers. We are led to suppose from this that the building itself would not go on with extreme rapidity, and it was probably, as I have said, carried out by slow degrees; and hence, although the detail of the aisles themselves indicates the date of the latter end of the thirteenth century rather than the middle, they may well have been merely the lengthened continuation of the great work commenced in A.D. 1236. There is nothing perhaps particularly marked or striking in the simple detail of this arcade to enable us to decide its exact date. But the vertical profile of the cap and base mould is an indication of its early character. This however appears to have been followed to a considerable extent in the later cap moulds. Still there is a sufficient difference between the earlier and the later to enable us to say with some certainty that these are of the date named. The pillars are octagonal, and the arches simply recessed-chamfered of rather massive character. There is a slight difference between the north and the south arcades in the height of the arches and level of the bases, as well as in the detail; as *e.g.* in the south arcade the chamfer is stopped out. Its pillar is shorter, and its arch higher. The abacus projects at the sides, as well as at back and front. There are relieving arches over the southern arcade of thin flat stones and the outer or southern side of this wall appears to have been built with greater care than the inside, in order to allow of its presenting, for the time, an exterior well finished face till the south aisle should be built. It is built too of small thin well packed walling stones indicating its earlier character than the other work. Over both of the arcade walls was a good deep corbel table hung out ready to receive the roofs of the aisles, when these should come to be added, without breaking in upon the walls or roof of the nave, which was in itself complete, and as yet without a clerestory. These corbel tables again exhibit about the same amount of difference as appears between the two arcades.

It is absurd to name positive dates for what is mere conjecture, but in order to convey to you an idea of my own impression regarding these dates, and of the general successive periods of the several parts, I may without pretensions to accuracy, say, that the south arcade was finished in A.D. 1245, the north arcade in 1255, the north aisle in 1270, and the south aisle in 1280, when the tower immediately followed. There is but little difference of character between the two aisles, but there is just enough difference in the measurements of the detail and treatment, to make it probable that the one was a few years earlier than the other. The difference consists not so much in the treatment of the window tracery, as in the splays of the jambs, the chamfers of the monials, and section of the labels. The pitch of the roof of the south aisle moreover was steeper than that of the north. On *this* account it might have been supposed to be the earlier of the two, were it not for the stronger indications of finish to the exterior face of the wall. There is a question relating to the chancel arch very difficult to determine. It was evidently rebuilt at an early period; for at the back of its northern jamb is the starting of a previous jamb of similar character and plainly *in sitû.* The east end of the chancel inclines slightly to the south. The southern as well as the northern jamb is thrust to the southwards. The one-sided effect of this is somewhat neutralised by this jamb being carried up only in one order, the inner order of the arch being carried on a tapered corbel, the south side being in two orders and thrust as far as it can go into the pier of the arcade of the Dunraven aisle. Possibly the chancel arch may have been rebuilt of its old material when the Gage aisle was added (A.D. 1446) when also the rood staircase appears to have been built, thrusting the pier as it were out of its place. This is ingeniously corbelled over to carry the abutting arcade of the Gage aisle. The arches, however, into this Gage aisle appear to be of earlier date than the aisle itself would lead one to suppose; and possibly it was not built but rebuilt and endowed by Robert Grinder with its £12. a year. The section of its western arch agrees in character with that of the chancel arch, whilst its side arches more closely follow that of the nave arches. It is not unlikely that it was in the first instance a narrow aisle, and afterwards enlarged to its present size. Its trellised parapet is yet later still, but this may have been a kind of reproduction after an earlier one.

Sir Richard Atkyns says that the south chancel aisle was founded by Sir John Joce in the reign of Edward III., by the owner of Cowerwall—Clerewell I suppose—and that it still in his time belonged to the family of that place—as indeed it does to the present proprietor of Clerewell Court—Lady Dunraven. It must have been built early in his lifetime. It had, however, undergone several alterations. It contained a square headed window which might have been of 1550 date, not in its original position but reset in the more recently rebuilt wall which had been thrust out by the pressure of the roof. The east window of the Dunraven aisle is five-light of a single order, chamfered; its tracery is uncusped, intersecting, of the simplest description of middle pointed work. It has a fine massive inner arch rib. The window is 12 or 14 inches out of the centre of the gable, to the north of it. This cannot have been for the sake of effect or of the perspective inside; but was probably occasioned by the remodelling of the gables when the roofs were renewed. For this roof appeared older than that of the nave aisle—not an original roof nevertheless—and the roof of the nave aisle had been framed and forced into a line with it subsequently to the removal of the arch separating the two aisles. There was no corbel table prepared on the side of the chancel wall, but only a single corbel subsequently let in for the reception of this roof, which was clumsily and insecurely supported upon some longitudinal pieces bearing east and west. Moreover, it is the ridge which is crooked, not the window; the window inside is midway between the walls. It may have been in order to obviate some of the one-sided effects of the short leg of the gable as compared with the outer.

The porch is fine and large, of somewhat remarkable treatment. Its outer entrance was protected in former times by large folding doors, in order to shut out the fierce south-west storms, and possibly also to resist attack. Close by this main entrance was a small side door in the eastern wall of the porch for use when the large doors were closed. The outer and inner main doorways are nearly alike in size and form. They are of very broad proportions, and have segmental pointed heads. Their section shews a moulding consisting of recessed quarter round. The outer doorway is simply of two orders, with a soffite rib, whilst the inner one, which is also of two orders, has plain jambs and inner arch as usual. Over the outer doorway is a single-light window, and over the inner doorway a kind of recess half filled up with a projecting narrow ledge on rubble stonework, whose purpose I cannot quite divine. These openings are cusped with soffite cusping of somewhat earlier character than the cuspings of the windows, which have feathered cuspings of small depth, whilst one of these is soffited and the other solid. By the side of this porch rises the short ridged, but high pitched and picturesque gable of the Probyn aisle—which is called, I believe, King Edward's Chapel in some old documents. The last incumbent of this chantry was Edward Fryer. Whether the present family of this name, whose burial place is close adjoining on the outside of the wall, is connected with him, I know not. This is popularly reported to be the chapel of the Joce or Joyce family. But it must have been erected much later than the altar tomb to his memory; and authority as well as architectural detail are in favour of the Dunraven aisle being the one founded by him. It is possible, however, that the Dunraven aisle was built and endowed by him in his early days, and that this was founded after his death to his memory.*

We now come to the tower. The eastern wall of this to a certain thickness must have been carried up with the nave, for there is the water tabling of the original nave roof still to be seen. The tower itself as it stands, however, cannot have been carried up at the same time, but this eastern wall must have been cased when the main body was built. For the tower itself is built of large squared ashlared stone work, with enormous flat buttresses, and a deep spreading plinth,—and the wall above this water tabling, which must have been at that time external—forming as I suppose a gable—is of smaller stone work, and not in any way corresponding with the other. The tower window is deeply recessed, both inside and out, with recessed quarter round moulding and monial. The only portion cusped is the vesica-formed quatrefoil in the head. The character of this cusping agrees with that of the other windows very nearly. The upper two stages are of later date. The lower stage is about 14 feet square, and the walls above 6 feet thick. The character of the tower arch is very much that of the chancel arch, but it consists of three sub-divided orders instead of two simple orders. About 9 feet from the floor is a row of stone corbels, for the erection of a ringers' stage—reaching less than half way up the height of the opening. These must have been built in at the time of the erection of the tower, in order to save length of pull for the ropes. The character of the lower part of the tower externally is very similar to that of Lydney in the same neighbourhood, and the west window in Lydney tower has a very strong family likeness to that over the south porch entrance of Newland church. The parapets and pinnacles of the tower have been modernized; but their mass, being built upon their old bases, is still very effective. The staircase turret is at the south-east corner of the tower.

The font stood near the tower; it is of seventeenth century date, but may have been cut out of the old font, judging from its massive proportions.

There is throughout the church an entire absence of buttress in the old parts. This is not uncommon in early churches on a smaller scale—more especially in the West of England. Some modern buttresses had been built in order to support if possible, the failing wall of the north aisle,—but in vain.

A few fragments of stained glass remained in the east window of the Dunraven aisle, and have been replaced. There were also a few fragments of encaustic tiles, which have been introduced into the pavement. There is a remarkable lack of piscinæ or sedilia for so large a church, there being only one piscina, in the Dunraven isle. The chancel walls had, however, I am persuaded, been rebuilt.

Having discussed the architectural history of the Church, we must now turn to its architectural state, past and present. I shall not repeat the oft-told tale of damp pavements, and close pews, and family galleries, with private stoves, but will pass on at once to its condition, merely saying in passing that this was more than commonly offensive in many respects. Of the vaults, floors, and fittings there is but little to say, except that the pavements declined considerably to the North, following the fall of ground, as often is the case in churches on the slope of a hill; and this involved some difficulty of treatment in the retention of this inequality, which was the more necessary in consequence of the heights of the door-sills and their jamb-stones agreeing therewith. And although it became necessary to rebuild the North wall entirely, I did not feel justified in making any difference of height in this respect, for this would have altered the relation of the height of windows and wall to the arcade opposite them to an extent that would have made the rebuilding a faithless one. To this wall, however, I thought it needful to add two buttresses, one at the end and one about the middle. The proportions of this elevation were such as to render a buttress between each window quite inadmissible. It also proved necessary to rebuild portions of the South aisle and Dunraven aisle walls. But the most serious work was the rebuilding of the south pier of the chancel arch, which, together with the whole south side of the gable, had become dangerous from spreading to the south, in consequence of the removal of an arch, corresponding with one in the north aisle, which formerly formed an abutment to it. There remained only the ragged fracture of the wall, showing where it had been; there was nothing to show its height or span. It was afterwards found necessary to rebuild three of the arches on the south side and two on the north, in consequence of the great inclination of the walls and serious settlement. This, however, was safely effected, in exactly the same form as before, excepting that in one of my visits I found the stone-cutters engaged in not merely taking off the white and colour wash from the stone, but in dressing down all the little inequalities of the chamfers and octagons of the pillars, caps and bases,—one of the very features giving them a character different from the later work, which appeared more regular and less rude. In answer to my remonstrances and denunciations for acting contrary to express orders, I was told they were at any rate "erring on the right side."

---

* I find that this was founded by *bequest*.

It proved necessary too to rebuild the eastern gable and part of the side walls of the chancel. I said that in the taking down of the old gable the portions of the sill of the earlier window were found. These were again replaced in their exact position. For the new east window I did not have the old Perpendicular one, which was a fine one, reproduced, for reasons which will appear presently; but I may add here that it was past restoration; and that, as you will have seen, the whole of the church from west to east had still retained its earlier character, except this window. And the same with regard to the clerestory, which was a very poor and bad one, and had arrived at a state of decay scarcely capable of sustaining its roof.

Upon my first inspection of the old roofs of the aisles, there seemed, so far as could be seen from the space above the ceiling, every reason to hope that they might be saved, although, from want of tie, they were evidently still spreading. I had provided for ties and for new wall plates, trussed so as to relieve the lateral thrust; but when the stone tile and the plastering came to be removed, that which had appeared sound on the visible surface proved so decayed as to be incapable of hanging together, and many of the couples actually broke with their own weight upon removal, and there was but little of the old oak that would use up again, and this only in short lengths. The old roof of the south aisle had either been renewed, or else had sunk to be about 2 feet lower at its ridge than the gable wall showed, perhaps partly both. The line of the ridge too of the south aisle was broken to a marvellous extent, like the contour of a distant range of hills. These roofs were framed of couples, which had been afterwards braced diagonally beneath to increase their strength. They were framed without principals, and considerable portions had been renewed from time to time. In longitudinal section some of the couples were slanted to the eastward, and stayed by upright couples framed into them, as is not unfrequently the case in such roofs. Both nave and chancel roofs had tie-beams, but these had sunk in the middle to such an extent as to throw their ends entirely off their bearings, leaving a space of several inches in height between them and the notchings of the wall plates, which they were intended to bond. These had in consequence spread considerably, carrying the walls with them. The Gage aisle had a flat roof of lead; this was recast and laid upon a similar roof. This roof had been lowered and remodelled, with partial renewal about the middle of the seventeenth century, when it had been brought below the arched head of the window, which I shall refer to directly. New roofs, therefore, were required over the whole building. Nearly the whole of the interior plastering required renewal; but I pointed such portions of the walls as appeared to have been built with the intention of pointing, and could well be finished thus. This has the advantage not only of showing the original masonry, but also of obviating some of the unpleasant effects of huge spaces of plaster surface. Such of the windows, doors, and other dressed work as were capable of restoration, without entire renewal, have been restored stone by stone. I was, however, sorry to find in the case of the Probyn aisle window, that the stone-cutter had destroyed instead of restoring the traceried head, and had worked a new one, on the ground that the old one was so irregularly cut that it was "more trouble than it was worth to reset it."

When the modern vestry was taken down, a good and somewhat peculiar east window of Perpendicular Third-pointed date was found in the Gage aisle. This has been restored and filled in with stained glass. The whole of this east wall was covered with modern monuments, belonging to the predecessors of Lord Gage; these have now been replaced in a less disfiguring position.

The foundations of the old walls and piers consisted of loose stones tumbled in at random, without being in any way placed in position. Nearly all of the thirteenth-century stone was selected from a good and durable bed, whether red or grey, but that used in the later work had perished wonderfully. It had become pulverised and honey-combed, and it required very considerable renewal. The old chimneys have been rebuilt in stone for the warming apparatus; the one over the chancel window being carried, instead, over the Gage aisle, and its place supplied with a gable cross. The whole of the roofs have been covered again with Forest stone slate. This then finishes the structural portion of the work. We turn now to the fittings.

The whole of the interior has been fitted with open benches. Those in the aisles have been made removable by folding up, so as to leave the magnificently spacious area as free as possible when not required for actual use. To this end, again, the floors of the seats are laid with wood blocks level with the pavement. The font has been placed near the south entrance, in a good open space purposely left for it. The chancel has been chorally arranged, with open stalls and simple carved ends and elbows. A gabled lectern is placed in the nave for the Lessons. During my first visit to the church I discovered the table of the ancient high altar; it was laid down as a pavement slab. There were objections to its being re-used for its original purpose, but I had it placed as a base to the new altar. It is of remarkable length, being 9 feet 3 inches long and 2 feet 3 inches wide,—exactly the same geometrical proportion as is found in the length and breadth of several early churches, and of many early lancet windows, measuring from sill to spring. It was thought that this would be far too long for proper effect, but the new one framed after the old proportion is now acknowledged to be just suited to its position in so large a church. The pulpit has been made out of remains of the old oak from the roofs, of which nothing was then left but fire-wood.

Of the monuments of the Church I have not much to say. There were several effigies in stone, which had been displaced from their original positions. These have now been protected and set, one in the Gage aisle, and another at the west end of the south aisle. In the Gage also is a remarkable memorial consisting of a triple cross inlaid in white thin marble, flat, into a Purbeck slab. There were also some fragments of brasses. These had been originally coloured and gilt, and I dropped upon a boy just in time to save them from being cleaned and polished, but not in time to preserve their first condition. There are also several early memorials in the churchyard, where is also the base of a churchyard cross of massive proportions. The principal memorial, however, is that one of Sir John Joce or Joyce and his wife already referred to. This consists of two stone effigies of the departed, upon a panelled altar tomb; the panels of the tomb are traceried and canopied. The work was delicately but boldly cut in Caen stone; the crockets and fynials were carved with spirit, but the greater portion had perished and dropped to pieces through damp. I rejoiced, however, to find that, from being covered up and protected by the jamb of the arch against which it stood, several of the panels were in perfect order for re-instatement, and they were such as to show the spirit and character of the work for the reproduction of the remainder. They were clean, bright and fresh as they came from the workman's hands. I had had it scrupulously and carefully removed for protection and restoration, and money was being raised to replace it. When I visited the Church some months after completion, I found that this had been committed to a stonecutter, who actually recut the surface of the effigies, to give them a freshness of finish, adding fingers and noses to the somewhat mutilated forms, leaving, indeed, the general form and outline as before, but scarce a particle of the original spirit. He also not only renewed the whole panelling of the tomb, but, so far as I could discover, made off with the old, excepting one poor fragment which he did not consider worth carriage, but from which I have taken the accompanying section, to contrast with the new section. The one is richly and cleanly undercut, the other is shallow and finished in a rough slovenly way,—perhaps in consequence of my former remonstrances as to the pillars, caps and bases of the nave. I trust that this fragment is now and will be henceforth religiously preserved by the side of the new work, if it is too imperfect to be still inserted in one of the new panels.

Such then is the report that I promised of what I might be able to lay before you as to the history of Newland Church, its architecture and its restoration; and I cordially agree with what has several times been urged in this room, that the particulars of all church restoration should be placed upon record, not only as a means of showing, for future reference, what is original and what is not, but also as bringing before those who are competent to deal with the question the difficulties and the treatment, whether right or wrong, that has been adopted; that so, by the comparing of notes, and the mutual interchange of the results of observation, experience and perception, we may learn more and more faithfully to discern and to preserve that which is good and valuable, and to adopt that method which shall best secure the great ends which we have at heart.

It is interesting to observe sometimes the different feelings with which church restoration is undertaken. Whilst one will consider it a pleasant work, another will look upon it as next door to an irksome duty. One delights in the very restraints imposed by the old forms, and another disregards and despises these forms, and feels his own freedom from restraint necessary to the full exercise of his powers. Although, happily, the number is rapidly increasing, there are as yet far too few who are thoroughly and duly impressed with a sense of the responsibility which the touching of old work involves. There may be considerable appreciation of the old work, and interest in being brought into contact with it, and yet there may be wanting a sufficient fear of injuring it by irreverent treatment. The restoration of an ancient church, such as that of which I have given a description, may be called the pleasantest and most interesting work which falls to our lot; but, on the other hand, it is in some respects the most painful, as it is also the most difficult and responsible. Very remunerative, in one sense, it cannot be called, to those who devote themselves heartily to the work; and yet, in a widely different sense, it may well be called one of the most profitable of employments, to such as are capable of receiving any impress from the spirit of those who erected these monuments of piety and art. But it is also one of the pleasantest of occupations. The whole building is full of interest from the bottom to the top, from one end to the other. The noble outline both within and without, the harmonious proportion and character;—I say still harmonious, for though various in age and style yet the same spirit pervades the whole of the ancient fabric; and the same general principles of design form a connecting link between the earlier and the later portions, to whatever extent they may have been developed, or howsoever widely they may differ in detail;—the air of repose which it breathes; the hallowed associations which it calls up and transmits from one generation to another, and which, indeed, have supplied much of the patriotic and ancestral love of his old institutions, so deeply rooted in the heart of the true Englishman: all these things, I say, impart a pleasure not to be found in other works. It is a pleasure to know for certain that with a moderate amount of care and self-restraint an effect of repose and harmony can be secured, which is so often wanting in new work. But besides this there is a pleasure in the disappearance of the sad signs of past neglect, and of past selfishness, and the re-appearance of somewhat, at least, of pristine beauty, spaciousness, and order, in the removal of incongruous and obtrusive fittings; as also in witnessing amongst the parishioners the revival of interest in, and the hearty appreciation of, that which was good in the ancient building, but had scarcely been discerned, or even discernible, by any but those whose eyes and hearts have been educated to see beneath the surface the overlaid and mutilated forms which truly still remained. And, above all, it is a pleasure to restore to its full meaning and dignity the ritual arrangement of the English Church, which, until within our remembrance, had been almost utterly lost sight of. Since the time of the spoliation of our churches, by the fanatics who, not content with the reformation of abuses and the eradication of error, sought also to eliminate from the church every mark of external reverence and order, and to set up oral preaching, as antagonistic to, instead of in unison with, preaching by the sacraments, nearly all ritual had been lightly regarded. And the churches having been despoiled, and their furniture, the accumulations of the wealth of centuries, destroyed, at a time of the subversion of the whole state, but little means remained for their reinstatement. The unsettled state of affairs, moreover, was not conducive to people's taking much interest in doing what could be done. Besides, the absurd "*quid prô quo*" argument which has subsequently arisen with respect to the personal and family *occupation* of the chancel by the impropriating lay rector, in consideration of his keeping it in repair, has had a most pernicious effect in the revival of church arrangement. That his obligation to the repair of it is in consideration solely of his receiving the emoluments, has been for a century or more all but ignored; and his tenure of it in trust for the ministers and clerks leading the services of the church, as is shewn by the evidence of existing documents, as well as by legal decision, to be the only true tenure, has been regarded as inconsistent with the fact of impropriation. Thus, through successive neglect and long-established custom, the fabric, as well as endowment, has been too often subjected to an impropriation never contemplated either by the letter or the spirit of the law, or by the original intent of the bad bargains made previously to and at the Reformation. How far it is right or wrong for a pastor or a parish to insist upon right arrangement, and the proper use of a chancel, in the face of an opposing impropriator holding fast by what he deems his prescriptive rights, is a question which is sometimes forced upon us, and in which we may often exercise a good or evil influence. Surely, in any part which we may have to take, we can but aim at the highest standard, and manfully fight for the Church's rights; only taking care in thus contending for an important principle, lest we be tempted to sacrifice a yet higher principle by a lack of Christian chivalry or by a breach of charity. And let us beware of rashness in defending the church's cause, lest we bring down upon her the consequences of personal failure; yet it is necessary to insist most strongly upon this arrangement; for the general effect, and the church-like appearance of the building, depend so entirely upon its being properly arranged in these respects. The gradients leading up to the central point of interest, and the raised position of the antiphonal stalls, leaving a broad and dignified access to that centre, contribute more than is commonly supposed to that effect.

There are some who consider a church constructed like Newland Church, with spacious chancel aisles, unfitted for congregational purposes, on account of some of the congregation not being in front of the pulpit. I do, however, unhesitatingly say, that for a *large* church it is a good arrangement. It is better to have a few of the congregation somewhat behind the preacher, than placed at so great a distance westwards as the extension of the church to receive them would involve. It is better to open the aisles to the chancel than to have them entirely blocked by a wall. Moreover, it contributes to the architectural effect of the interior, by allowing great play of light and shade, and to its perspective by a grouping of arch and pier, which is not so well attained by other means. I urge this the more strongly now, because some have lately abused it in existing buildings as being unmanageable, rather than effective, and have regarded its re-production in new churches merely as a puerile imitation of a form of building adapted only to the many-chapelled plan of the old churches. But it is in this respect, amongst others, that the interior of Newland Church is so wonderfully effective; and it certainly is a pleasure to watch the revival of such effectiveness, by the removal of the huge erections which had, as in this instance, encumbered it.

This, then, is the pleasant side of the picture. But it has also, as I said, its painful side. It is not all so bright as at first appears. One has to lament the loss of many of the best features; some through damp and decay, others through wanton mutilation, and still more, perhaps, through reckless alteration; some through ignorant but pains-taking attempts at renovation. One has to deplore the loss or destruction of the character, and even of the remains, of ancient detail, by workmen charged, again and again, not to touch them. Workmen cannot comprehend the value of a grey surface; or of an ancient moulding-profile left intact; or of that absence of precision which at times imparts a pleasing tone to the general effect. But, even with most careful restoration in work that is much decayed, as in the case of the east window before referred to, we have to deplore the necessary renewal of vestiges which cannot be replaced, and which, if merely re-produced, would have neither value nor interest. Imitation of old work may be tolerably faithful, but it is *not* old work, and it cannot be referred to as such; it is like the lifeless body; the spirit has taken its flight, and has left but the vague semblance of what it once was. And if haply any life-like spirit *is* infused into the re-production, it is not the spirit of the old, but the spirit of a new life; and whether worse or better than the original, it bears the impress of the mind, not of the ancient architect, or of the ancient mason, but of the modern. Again, the difficulties attendant upon faithful restoration are very great. Strong conservatism is, of course, the only true principle, and the only safe guide. A scrupulous regard for all that has gone before, in order that it may be handed down as intact as possible to future generations, is the only spirit in which we may dare to approach our ancestral heritage. But herein oftentimes consists one of the greatest of the difficulties with which we have to contend. It is often needful to sacrifice some portion, in order to a safe and permanent restoration of the remainder. To determine exactly what those portions ought to be—what to be retained or restored—what to be renewed or re-produced—is often an anxious and difficult task. One ready way of surmounting the difficulty appears to be—to have no care for what has gone before, to disregard Mediæval remains, or to regard them only in the light of mere antiquarian lore, all very good in their way if they do not interfere with modern requirements and use. But the responsibility of removing ancient landmarks, or of breaking a single link in the history of our art, is not so easily to be overcome. Whether we are conscious of its burden or no, the weight of responsibility still rests upon our shoulders, and the responsibility is one not merely of a "let alone" nature, as some appear to take for granted, but of active deliberation as to what is best to be done. For instance, to leave work in its old state, with the certainty that in a very few years it must come to renewal, and then at great disadvantage; and that in the interim a more substantial portion of the fabric must assuredly and irremediably suffer to its final detriment rather than preservation; to leave work, I say, in this state, may show greater soundness of motive and feeling, than of judgment and discretion. The doctrine of "do something" is sometimes shrunk from and repudiated as though it opened the door to needless and reckless renovation. But I maintain, that the determination to look upon a question only from its safest side, and in its most favourable light, is not the way to lead to the most successful results. We must look at all sides of a question; without this, an unguarded advocacy of ultra-conservatism may, through its obvious indefensibility, lead to the very evils which it seeks to avoid, and which it must be the earnest endeavour of all to escape from. For the principle of strict and conscientious conservatism is the only basis upon which to build any theory of Church restoration. But a further question forces itself upon our attention, and it must not be set aside as though it were a very plain and simple matter, upon which no doubt could exist, as has been many a time intimated. This question is, as to the mode of renovation of works, necessarily removed or decayed. How far an exact re-production of what was supposed to be the original, or to be the original with several subsequent alterations; or how far the earlier or the later, the better or the worse, should be followed, when the marks of the one, or of the other, are more or less evident: or, once more, to what extent necessary alterations of, or additions to, a building, should follow this or that portion of the original fabric; how far the style of either part should suggest the treatment, or how far it is safer to treat them distinctively, in order rather to show what really is old, and thus to distinguish it from the new—this also opens a wide range of questions which involve difficulty and responsibility, and which are scarcely capable of definite or comprehensive rule. However, generally speaking, whilst on the one hand new work, whether in additions or in insertions which are essentially new, may be carried out with distinctness enough to prevent the confusion of the old work with the new; so on the other hand all traces of old work ought, if possible, to be re-inserted carefully, and exactly in their original position, where necessarily removed, for the benefit of those who may come after; for we have no right to deprive them of the benefits that we may have derived from the remains of ancient work, which will still tell their own story to posterity, in a manner far superior to any that we can urge, and with a vividness and impressiveness not to be equalled by any power of verbal description.

I am exceedingly sorry to find, that with every good intention of conciseness and brevity, I have already exceeded my due limits, without touching upon the equally, if not yet more, important matter of church arrangement. This must stand over for a future time; for as I told you at first starting, I shall not now rest till I have laid before you my views herein. Should there be no opening for it this Session, or even next, I shall yet pertinaciously look forward for the opportunity of urging my plea, on behalf of that which I believe to be the first and most essential of all the elements of Church Architecture.

Mr. J. W. PAPWORTH, Fellow, was quite sure no one would think that the pertinacity self-attributed by Mr. White should be considered blameable, inasmuch as it had produced the promise he had made of a paper stating the views that he held upon the arrangement of churches; and whenever they might be put forth, with the fertility of language and the moderation of sentiments evinced in the present paper, the Institute would surely be happy to hear those views, to discuss them, and to learn from them as much as possible. As Mr. White stated that in the tower of this church a belfry stage had been made "for the purpose of saving the ringers pulling a long rope," he (Mr. Papworth) would be glad to know if Mr. White knew this to be the case, or whether it was merely a suggestion of his own?

Mr. J. P. SEDDON, Hon. Sec. said he believed it was generally considered desirable to shorten the length of rope by the insertion of a belfry stage, and that ringers preferred it to ringing below. He himself had in his own practice a similar case to this, in which the bell-ringers expressed a preference for a belfry stage rather than ringing from the lower floor.

Mr. PAPWORTH believed it was the wish of bell-ringers not to be looked at by other people; and if they could not get a belfry stage 30 ft. up, they would be content with 8 ft. or 9 ft.

Mr. WHITE said that would have been the case if there had been a western door, which there was not.

The CHAIRMAN said in two instances he had seen this year great erections of wood and iron made to serve as guides for the ropes, it being found impossible to ring with the great length of rope from the bells to the floor. He had generally found that bell-ringers did not like a greater length of rope to pull than 20 ft.

Mr. PAPWORTH, 20 or 25 ft. is not too long a pull, that is to say 30 ft. from the top of the wheel to the floor of the bell ringers' stage.

Mr. WHITE said this stage at Newnham was 25 ft. from the bells.

Mr. PAPWORTH, referring to the fact stated in the paper that the whole of the pavement in the interior of this church had been laid with an inclination towards the north, suggested that it had been done with a view of the water draining off the pavement after being washed down. In some of the Continental cathedrals there was a decided slope of the floor to the west doors; and in English churches most carefully built the same description of slope was to be observed.

The CHAIRMAN thought the difference in the level of the ground had more to do with it than the washing. At Scarborough church the north aisle was considerably above the level of the south aisle.

Mr. PAPWORTH, referring to the statement in the paper that the walls of the tower were of large ashlar, asked whether it was meant that the whole thickness of these walls was so constructed.

Mr. WHITE explained that he only referred to the exterior and had not examined the interior of the work.

Mr. PAPWORTH wished to inquire whether in the case under consideration the rood screen was considered to belong to the chancel?

The CHAIRMAN said the rood screen was generally connected with the chancel arch, and the chancel arch belonged to the nave undoubtedly.

Mr. PAPWORTH agreed; but said the point he put was whether the rood screen belonged to the chancel arch, or whether as furniture it did not belong to the chancel.

Mr. SEDDON remarked that the rood screen was sometimes more in the nave than in the chancel.

Mr. PAPWORTH noticed that Mr. Seddon's observation added to the difficulty of deciding to which part of the church the rood or other screen belonged.

The CHAIRMAN said they must be guided in that by what they found in the particular construction of the building.

Mr. PAPWORTH said in a case in which he was consulted the rood screen stood across the whole church, without any other constructional division between the nave and chancel, and the architects engaged respectively to repair the two portions had great difficulty to decide to which portion the rood screen belonged.

The CHAIRMAN admitted it was a very nice question. The chancel arch undoubtedly belonged to the nave.

Mr. SEDDON remarked that generally speaking the approach to the rood screen was from steps in the nave, the rood screen itself was under the centre of the arch, and the greater part of the loft was in the nave, and he should thence conclude that it belonged to the nave.

Mr. PAPWORTH said he was not himself aware of a case of the kind that had been argued and judicially decided.

The CHAIRMAN added that he was not aware of any such case, and he had had difficulty in determining the question himself.

Mr. WHITE said it was the less important, because practically they could not enforce such a thing.

Mr. PAPWORTH, the impropriator might say "If the rood screen is mine I will remove or destroy it," but the parishioners might say "No," as happened in the case he had mentioned; although usually the wish for its destruction was expressed by the parishioners and the opposition had to come from the person who had to repair the chancel.

Mr. **White** remarked that the impropriator had no right to destroy it.

Mr. **Papworth** had heard with great satisfaction the observations by which the author of the paper had shown that frequently in such a restoration, the duty of the architect to study the future as well as the present pecuniary interests of his clients, would lead to a satisfactory solution of questions that might arise as to how much should be repaired, and how much should be new. He also cordially sympathised with the author's views as to the necessity for leaving visible and distinct and untouched the original fragments of repaired or rebuilt work; so that the apparent evidence of details more or less curious might not be so much mistrusted by the future student in England, as would be the case on the continent, especially in France. He begged, therefore, to close his remarks by moving formally the usual vote of thanks for the paper to Mr. White.

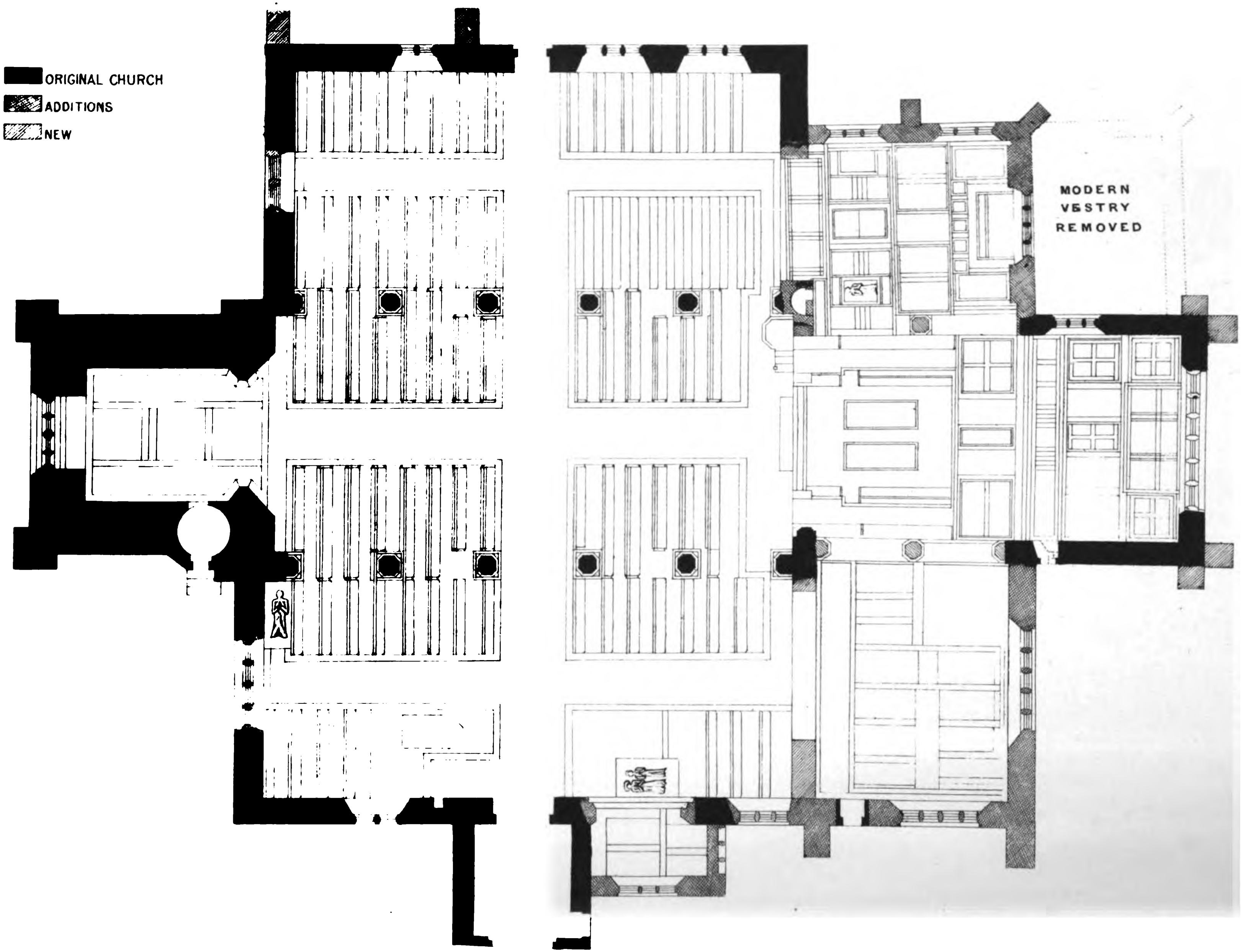
Mr. **Seddon** said as no time was left for the discussion of this paper, he would, in seconding the vote of thanks, just state that he had visited this church both before and after its restoration. He could testify to the deplorable state in which it was on his first visit, and also to the condition in which it now was. It was now a most interesting and noble church, worthy of the distinction it possessed as being the mother church of the Forest of Dean, and he gladly seconded the motion made by Mr. Papworth.

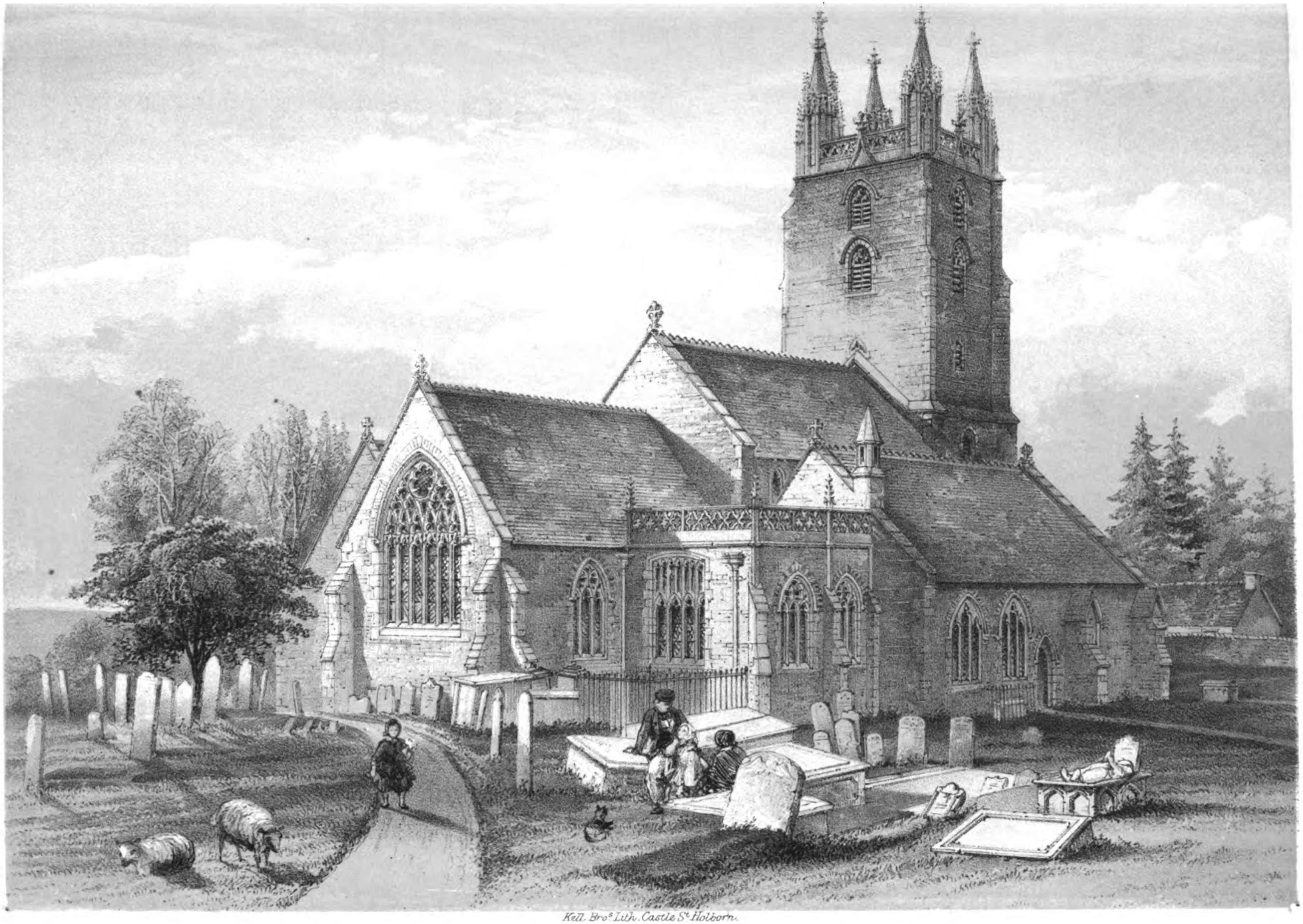
The **Chairman** was quite sure they would all agree with the proposer and seconder of the motion, that their best thanks were due to Mr. White for his paper, and that they would be glad to welcome him again, to hear his further opinions on the subject of church arrangement. In connection with the preservation of churches and ancient monuments he might mention that the committee for the conservation of ancient monuments had been re-appointed, consisting of the President, Mr. Ashpitel, Mr. J. Bell, Mr. Burges, &c., to which he hoped that the Council would add the name of Mr. White.

The meeting then adjourned.

Newland, Forest of Dean, Church of all Saints

AS RESTORED





Kell. Bro^s. Lith. Castle S^t. Holborn.

Newland, Forest of Dean, Church of all Saints

AS RESTORED

A FEW WORDS IN FAVOUR OF THE DECIMAL BUT AGAINST THE METRICAL SYSTEM OF MEASUREMENT; AND AN ENDEAVOUR TO SHOW HOW ALL THE ADVANTAGES OF THE METRICAL SYSTEM MAY BE OBTAINED WITHOUT GIVING UP THE ENGLISH STANDARDS.

By F. C. PENROSE, M.A., Fellow.

Read at the Ordinary General Meeting of the Royal Institute of British Architects, November 30, 1863.

It will be, no doubt, remembered, that a bill was introduced last session into parliament for altering our weights and measures by the adoption of the Metrical system, of which the *second reading* was carried, but owing to the press of other business it did not proceed further. Mr. Ewart however, the proposer of the bill, signified his intention of re-introducing it, and as the legislature, by allowing the second reading of the bill seem to have adopted *the principle* of the measure, it becomes to us one of very great and practical importance, and one which the Institute is bound fully to consider. One step has already very properly been taken by our Council in petitioning Parliament in a general way for the adoption of the Metrical system: doubtless under the impression that this system offered the only hope of escape from our present anomalous methods, and the only practicable way of obtaining the advantage of decimal computation. If this indeed seemed to be the case, I should not now ask you to re-consider the question: but if, as I venture to hope, I shall be able to point out a plan which will secure almost all the advantages which are looked for, and avoid a very great part of the inconveniences which would inevitably attend an alteration of the standard by which we have been accustomed to work; it will be for you to consider whether a petition going more fully into the question may not be addressed to the legislature, who will no doubt be willing to give it the consideration they have invariably shown to this Institute.

There may be doubtless a difference of opinion as to whether any change whatever is desirable:—that is, however, much too wide a question to be discussed in a short paper, and I must beg to be understood in what follows, not so much to be advocating change, as to be taking it for granted, that we *stand committed to some change*, and to be pleading for the improvement of the system to which we are accustomed, rather than the adoption of the French metre, which would entail very great difficulty upon the class of artizans even more than on ourselves, and which, although it promises ultimate advantages, would be attended with serious drawbacks.

The objects to be obtained are:—

(1) Uniformity of system.

(2) Decimal computation.

(3) Agreement with the French standard, which has obtained a great hold on the Continent of Europe.

I should refer to the evidence taken before Mr. Ewart's Committee for arguments in favour of uniformity of system, if it were not that we meet with too many annoyances in our own practice to render such arguments necessary. What with strikes, chaldrons, sacks, hods, loads, bags, &c., perches of various lengths, ropes, cords, chains, ells, nails, hands, &c., and in weights, the septenary scale, pounds troy, apothecaries, and avoirdupois, and several varieties of stones, we must often wish for a more uniform system, such for instance, as would be attained if every measure of capacity were reckoned in gallons, every measure of length in feet, and every weight in pounds avoirdupois, and of course such other terms as are necessary to express the multiples and sub-multiples of these standards in the simplest possible form, or any other uniform and general system.

It may also be asserted that any thing which is found troublesome to beginners, requires more effort even to adepts than what was obvious from the first. It may not amount to much in a single instance, but it *does* ultimately tell. I will instance the unnecessary confusion introduced by measuring land by the chain, rod, yards, &c., and superficial extent in most other things, in feet. We use indeed the land measure for our rod of reduced brickwork, but is it not evident that the square of 100 feet by which we measure the areas of roofs and floors, &c., is an idea more immediately grasped in the mind, and in fact gives less trouble in computation?

One is led to remark in passing, that it seems strange that we have not rejected a number so troublesome to deal with as 272, and which after all is not the correct square of 16 ft. 6 in. for the simpler number.

It can hardly be necessary to say any more in favour of uniformity; and for any further argument I must refer to the Blue Book.

In what follows, I must confine my remarks to the question of mensuration, leaving coinage, weight, and capacity alone; not that there is more difficulty connected with these questions, and I grant that in a full consideration of the subject they cannot be disunited, but because mensuration is a subject which belongs to us in a peculiar manner, we may, I think, consider it by itself.* I will, therefore, briefly consider the relative merits of decimal and duodecimal computation as applied to measurement, and which no doubt admits of argument on both sides, and premise that after the full consideration, which I hope will be given to this question, should you be strongly of opinion that the advantages lie in favour of the duodecimal scale, it would be, I apprehend, the duty of the Institute to petition Parliament, not to sanction any alteration in the direction of decimal systems; but I cannot but think that an opposite conclusion will be arrived at, and I believe that few, if any, who have fairly tried the decimal system and know its power, will feel much hesitation on the subject.

It is confidently asserted by Mr. Ewart's Committee that none of the nations who have adopted the Metrical system have had any desire to give it up. This I fully believe, but obviously owing to its decimal form, and not to the peculiar standard called the metre. Let us for a moment leave out of our consideration our English methods. Most of us are familiar with the decimal coinage of France, Switzerland, and Italy, and with the divisions by thirty and sixty which prevail in the coins of Germany, and which is essentially the same as the duodecimal system. Can we doubt for one moment which of the two is preferable, and which entails the least trouble on travellers.

In favour of the duodecimal scale it is urged that as 3 is a lower number than 5, more numbers can be divided by an unit with 12 sub-divisions, than by an unit with 10 sub-divisions. This advantage cannot be altogether denied, but it is mainly confined to integer numbers. For instance, let 241 feet be divided by 3, we obtain in the one case 80 ft. 4 in., or in the decimal scale $80\cdot\overline{3}$ ft. (the bar over the 3 expresses the recurring decimal 3333, &c.) As a case of fractional quantity let us take 241 ft. 8 in.; this divided by 3 gives in one case 80 ft. 6 in., $\frac{2}{3}$, in the other $80.\overline{5}$, which is obtained with quite as much ease and is as readily and correctly found on the rule. Suppose now the advocate of the decimal system to retaliate and ask his opponent to divide 241 ft. by 5. The answer 48 ft. 2 in., $\frac{2}{5}$, may be compared with 48·2 ft., where the advantage evidently belongs to the decimal scale.

---

* I will merely observe that it would be easy to conciliate our measures of weight and capacity with the Metrical system, in a manner nearly analogous to that which is suggested further on for the measure of length, by making a very minute change in our own standards.

For 10 kilogrammes = 22·06 lbs., and 100 litres = 22·01 gallons.

It will be obvious that an alteration, which would be practically inappreciable in our weights and measures, would render them readily convertible into the Metrical system. An objection has been, I think, very properly made against the use of the decimal system in the lowest denomination of coinage, weights, and measures of capacity, but which does not apply to measures of length. This may be easily met by keeping the lowest denominations on the binary scale as we have it at present. There is strong reason for believing that farthings are more convenient in use than centimes, and quarter ounces than five gramme weights, and for purposes of calculation the binary scale may at once be translated into the decimal.

Again, as it is easier to divide by the eye a small residuary quantity by 3, than to divide it by 5, it is evident the duodecimal rule aids us where we require it less, and the decimal where we require it more. It is therefore doubtful even in this limited part of the question (and which is the one strong point of the duodecimal claim) whether the case is made out in favour of the duodecimal.

Then the notation of the decimal scale is simpler and less liable to error, the only accent we have to consider being the decimal point—and even when this, by accident, is erased or misplaced, the nature of the case will generally supply the correction. It is not so in the duodecimal scale, you are greatly dependent on the accents for the avoidance of mistakes, and have not the same means of settling a doubt between such figures as 11 in. and 1 ft. 1 in., supposing the accents illegible or otherwise at fault, as you have between 1·1 ft. and 11· ft. for instance. The continuity of method also gives rapidity and accuracy in taking dimensions. Instead of balancing, which is the nearest inch, quarter, or sixteenth of an inch to write down, we can quote without hesitation the absolute value to the tenth, hundredth or thousandth of a foot, according to the amount of accuracy demanded. Again, for almost all nice calculations founded upon dimensions taken in feet and inches, you must convert them into decimals—as, for instance, to obtain the assistance of logarithms, or that most useful application of logarithms, the engineer's slide rule: and lastly it is only through a decimal scale that we can associate our standard to the Metrical system. I can hardly believe then that the Institute will recommend a retrograde course, and I will presume that we approve of the action of the Council, so far as uniformity and decimal computation are concerned. Our next consideration will be the method by which these advantages are to be obtained.

It must, I think, be obvious that we should obtain important advantages if our standard agreed with the French metre: commercially I presume very great:* to us, as architects, and for other scientific purposes considerable; and these considerations added to the fact, that an uniform and decimal system is there already existing, led to the proposal for the adoption of the Metrical system, and its acceptance in principle by Parliament.

The objections to the metre appear to me, however, so great that I cannot but think that two other courses are preferable, one which has received much consideration, namely, the adoption of the decimal foot, and another which I wish to bring before your notice.

I will first consider the metre in reference to the English decimal foot.

Prof. de Morgan in his evidence before Mr. Ewart's Committee stated his opinion that he considered the metre as too large a standard for ordinary use; and a writer in the Times, a few days after the parliamentary division referred to, stated that he had had much experience in France as a surveyor, and that he found that measurements taken in metres required more figures and consequently more labour than similar operations in feet and inches. We may, I think, readily see how this might be the case.

---

* Although the metre has obtained great acceptance on the continent of Europe, it is not, however, universally adopted. I believe that Russia uses the English foot to a greater extent than the metre, and North America and our own colonies are also to be considered.

For most purposes in measure and value work it is not necessary to consider fractions of inches, and the feet in a very large number of cases do not run into numbers higher than 10. Take for example, a block of stone which measures approximately 3 ft. 9 in. × 10 in. × 7 in.; the cube of which by duodecimals is 1 , 9′, 10″, 6‴.* The nearest expression in feet and tenths would be 3·7 × ·8 × ·6, of which the cube is 1·776. As 1 , 9′ duodecimal, is equivalent to 1·75 decimal, it may easily be seen how small a difference would arise from using roughly the decimal foot. But with the metre if we go no further than decimetres we should have 1·1 × ·3 × ·2 = ·066 cubic metres, equal to 2·333 cubic feet. It is evident therefore that the decimetre would not suffice even for rough measurement, and it would be generally necessary to consider the centimetres also, which, from necessitating the use of more figures in squaring and cubing, &c. would neutralize much of the advantage of the decimal system. I have, of course, been speaking of ordinary measurement for the purpose of valuation, where a little judgment is exercised in give and take to save labour in calculation, and what I have said does not apply to the measurement of large things, but the chief labour is in the multiplicity of small items.

In adopting the metre we should have to revolutionize our ideas of reckoning, for although accustomed to the use of inches we might without much trouble translate a measurement in inches into decimals —for instance, 9 in. is easily perceived to be 75 per cent. of a foot, but it is very different to conceive an equally clear notion of it as 23 per cent. of something rather longer than a yard. For the above reasons I must think the metre decidedly less desirable than the decimal foot. The objections to the decimal foot, however, are that it would not give us much assistance in comparing our measurements with the metrical system; and that when the importance of small measurements which have been established in inches is considered the inch is not lightly to be given up. Is it possible to reconcile all these difficulties? I think it is, and have now to bring before your notice a decimal system which, unless I deceive myself, would give a sufficient relation with the metre for commercial purposes, and with the minimum of inconvenience to ourselves and some other special advantages in addition.

The metre is 3·2808992 English feet. Originally it was supposed to be one ten-millionth part of the quadrant of the meridian of the globe, but as this was based on an erroneous view of the figure of the earth it has lost the astronomical interest to which it aspired. 3·2808992 ft. is equivalent to 1·0936331 yds., which is not a number very easy of comparison with unity. It is, however, very nearly as 525 : 480, for $\frac{525}{480} = 1·0937500$, and $\frac{525}{480} = \frac{100}{96} \times \frac{105}{100}$.

If then the English foot were increased by one twenty-fourth part, the yard of three such feet would have the simple relation to the metre of 100 to 105, with sufficient accuracy for almost all practical purposes. The error would be about one ten-thousandth part, and would not exceed one mile compared with the diameter of the globe.

What would be the result upon our measures of altering our standard to this extent? We should obtain a decimal scale in which the eighth of an inch, absolutely unaltered, would form the element.

The new foot or "span," if for the present I may be allowed so to call it (for the sake of avoiding mistakes between it and the foot) would consist of one hundred eighths of inches. To reckon measurements of length by this new standard would not alter our general notions to any important degree. It would be convertible to or from our present foot by the easy process which will be best seen from the following example:—

---

* The common practice of placing one accent (′) over the feet, and two (″) over the inches, has two inconveniences. It is contrary to the analogy of other measurement—such as of angles.—It also foregoes a great advantage in multiplication by duodecimals. If we place the single accent over the inches, &c., the place of any figure in the product is found at once by adding the accents of the factors.

Let 13·28 spans be proposed to be converted into feet.

$$\begin{array}{rcrl}
13^{\text{s.}} & = & 13^{\text{ft.}} + & 6\tfrac{1}{2}^{\text{in.}} \\
\cdot 28 & = & + & 3\tfrac{1}{2}^{\text{in.}} \\
\hline
 & & 13^{\text{ft.}} & 10\ ^{\text{in.}} \\
\hline
\end{array}$$

Let 13 ft. 10 in. be proposed to be converted into spans.

$$\begin{array}{rcrl}
13^{\text{ft.}} & = & 13^{\text{s.}} - & 6\tfrac{1}{2}^{\text{in.}} \\
\cdot 10^{\text{in.}} & = & + & 10\ ^{\text{in.}} \\
\hline
 & & 13^{\text{s.}} + & 3\tfrac{1}{2}^{\text{in.}} \\
 & = & 13 & \cdot 28\ ^{\text{Spans.}}
\end{array}$$

Conversion into the French measure is quite as easy.

Let 435 metres be proposed to be converted into span yards or yards of 3 spans.

$$\begin{array}{rrl}
 & 435{\cdot}0 & ^{\text{Metres}} \\
\text{add 5 per cent.} & 21{\cdot}75 & \\
\hline
 & 456{\cdot}75 & ^{\text{Span yards}} \\
\hline
\end{array}$$

Let 456·75 span yards be proposed to be converted into metres.

$$\begin{array}{rrl}
 & 456{\cdot}75 & ^{\text{Span yards}} \\
\text{deduct 5 per cent.} & 22{\cdot}84 & \\
\hline
 & 433{\cdot}91 & \\
\text{add 5 per cent. of the previous deduction} & 1{\cdot}14 & \\
\hline
 & 435{\cdot}05 & ^{\text{Metres}} \\
\hline
\end{array}$$

To return to the advantages of this system for home use. It would not be necessary to reconsider our national standards upon which so much labour has been bestowed: for the span and foot are immediately convertible as shown above. Moreover, it would have even a more perfect analogy with the measurement of the globe than the metre is found to possess. If we make 5000 spans our mile, which would differ from the present mile by less than 24 yards, it would be exactly six-sevenths of the nautical mile. The correspondence of seventy such miles, with a degree of the meridian measured in latitude 45° is very remarkable. It is stated in Herschell's Outlines of Astronomy, Article 216, that a degree of the meridian measured in latitude 44° 51′ was found to be 364572 English feet; and seventy *span miles*, or miles of 5000 spans, reduced to feet gives 364583. Two hundred spans would form the side of a square acre, differing less than one perch from our present acre, giving, of course, 40,000 square spans to the acre and 10,000 to the rood. The square mile would contain 625 acres, or 16 square miles would contain 10,000 acres, and a piece of land of the breadth of one square acre (*i.e.* 200 spans) and a mile long would contain 25 acres; it would therefore no longer be necessary to use one measure for land and another for other purposes.

It will be observed that the proposed scheme retains the service of the inch, so that whatever small measurements we are familiar with (and this is of immense importance to artisans in every trade) are at once found on the rule. Our familiar half brick of 4½ inches for instance, is obviously 36 cents. The measurements of delicate objects, for which hitherto decimals of the inch have been used, are converted by multiplying by 8. I am inclined to think that this advantage, independently of the considerations of the simplification of the mile and the acre given above, and the simple relation to the French metre, would alone suffice to claim for the *span* (or whatever we should feel disposed to call this measure) a preference to the decimal foot, and in every respect a preference to the metre.

ON THE PARIS STREET IMPROVEMENTS, AND THEIR COST.

By W. Tite, M.P., F.R.S., &c.

Read at the Ordinary General Meeting of the Royal Institute of British Architects, December 14, 1863.

The improvements that have lately been effected in the streets of Paris are of so very extraordinary a character, and they have given rise to the promulgation of such singular opinions as to their results, that I have been induced to look into the question somewhat closely. I have always held that the making of a new street, in the heart of a city, was an operation that must be attended with a positive loss to the body undertaking it; in some cases amounting to as much as 60 per cent. of the capital employed in it; and I was therefore anxious to discover, if possible the result of our French neighbours' experience in the matter. It is said that they "manage these things better in France, than with ourselves;" and that, in the Rue de Rivoli, for instance, the works of street improvement had been accomplished with profit; it became then a matter of interest to endeavour to discover the facts of the case, and I therefore took measures to ascertain the cost of the new streets from the official Reports. My examination has led to a confirmation of my opinion, and to the belief that the improvements of Paris have cost at least the proportion that I have named; and instead of having yielded a profit, the recent alterations have in all cases proved to be a source of very considerable loss.

The great operations in Paris began in the year 1848, by the works which have been undertaken for the purpose of continuing the Palace of the Tuilleries, to the Louvre; which was subsequently extended to the disengagement of the Hotel de Ville, and the continuation of the Rue de Rivoli, to the prolongation of the Rue St. Antoine. This was a very necessary improvement; for the streets which were demolished had, in 1848, been the stronghold of the insurrections that marked the year; and they were so close to the public buildings named, that the latter were always in danger of being seized by the mob, when there was any disturbance. In addition to this strategetical motive, there was the consideration that Paris wanted ventilation in this direction, and that the communications from the east to the west would be immeasureably benefited by the new street; but if this circumstance gave the promise that the benefit of the operation would be great, it also entailed upon the City several necessities, which I shall have occasion to revert to hereafter. In the meantime, the movement was given to pulling down of houses, and rebuilding them in a more magnificent style: the Boulevard Sebastopol was undertaken, the Halles Centrales were begun; the Boulevards St. Germain, de Prince Eugène, des Ecoles, de Malesherbes, de St. Michel, &c., were in turn commenced; the Rues de Rouen, the opening of the new quarter de l'Opera, the remodification of the Chaussée d'Antin and the Rue Basse du Rempart, the prolongation of the Boulevard from the Opera to the Theatre Français, &c.: were all decided upon, and they were all commenced. The State intervened in the various cases, with a subvention that varied in amount from one half to one third of the cost; and it has always proved itself anxious to contribute to the embellishments of the City. It has from time to time authorized the town to contract loans to the amount of 180,000,000 francs up to the close of the financial year 1861; and has facilitated this employment of public credit in every way that it could; it even would appear from the statement by the Prefect that it had paid, upon the operations then ascertained to have been effected, the total sum of 40,500,000 francs. There was no occasion, however, for the strict account being made up between the City and the State; for the works of the Bois de Boulogne, the Parc de Monceaux and the Bois de Vincennes, had also to be included in the sums that the Crown would have eventually to give credit for; the proceeds of the sale of the waste land, and of the building materials, also were added to the resources which the authorities of Paris could dispose of in the mean time. The works of demolition and re-construction, therefore, have proceeded with a vigour that has passed belief, and the city of Paris has been changed with a rapidity that we, Englishmen, can have no conception of.

There is indeed something that is very remarkable in the steps by which Paris has been brought to its present state, and they do, indeed, savour strongly of magic. The broad straight boulevards, the numerous places and squares provided from distance to distance for the comfort and recreation of the people, the various places formed for their promenade in the Bois de Boulogne, the Parc de Monceaux, and the Bois de Vincennes—all testify in the highest manner to the anxious care with which the Administration provides for the wants of those committed to its charge. In the Prefect's Report, there also appear the accounts of the city of Paris for the repairing, and the decoration of the churches, and the public buildings, that fall to the care of the Municipality; and they are, it must be confessed, maintained in a better state than similar buildings are by the English authorities. But the question arises, in spite of ourselves—how is all this outlay to be met? M. Ferdinand de Laysterie said, in 1861, that the City of Paris had incurred liabilities, by the decision of the Juries, to the extent of 321,000,000 francs; and that the liabilities of the City were far from being limited to that sum. The liabilities seem to go on increasing from year to year; the resources do not seem to increase in the same manner, and though the credit of Paris be good, a too frequent resource to that means of meeting the demands upon it, seems a doubtful course. The reasons why these questions occur so forcibly to my mind are, that I am convinced that every one of the improvements must be a source of outlay to the City, and it cannot go on in this manner adding indefinitely to its obligations; nor can the State continue to augment the public burthens for the sake of the dwellers in Paris. The nature, and extent, of the claims upon Paris for the expense of the improvements will be best judged of by the inspection of the returns; but these it must be observed are but a small part of the obligations of Paris in the matter. Indeed it is hard to discover, in the returns that are submitted to the town council, anything like a clear statement of the cost of any one of these operations; for they spread over so long a time, and they are so complicated in themselves, that it is not easy to arrive at any correct result from their examination. Nevertheless, the results of the operations of the Halles Centrales, the prolongation of the Rue de Rivoli, and the Boulevard Sebastopol on the right bank of the Seine, are already sufficiently known to enable us to reason upon their results with something like certainty.

The Halles Centrales gave rise to an outlay that was in itself purely commercial, and it would be fairer to compare the cost of that operation with the similar one undertaken by the Corporation of London in the removal of the Fleet Market. However, the cost, and the returns, of the Halles Centrales appear in the Prefect's Returns as follows:

Dr. HALLES CENTRALES. *Cr.*

	Francs.		Francs.
Sale of old materials . . .	389,170.74	Land	19,523,879.78
Sale of spare lands . . .	2,953,516.43	Reconstruction of houses .	157,875.00
Divers products	473,731.86	Buildings	11,464,021.11
Properties unsold at 33 years' purchase on 88,080,37 fr.	2,906,652.21	Roads, &c.	535,660.09
	6,723,071.24	Square of Innocents, and Fountain of Nymphs . .	114,802.03
Loss on this operation . .	25,073,167.37		
	31,796,238.61		31,796,238.61

The returns of the Rue de Rivoli are given somewhat more in detail, because the State has intervened in very different proportions in certain parts of the work; thus the accounts of the creditor side appear to be—

	Francs.	Francs.
1st Operation at the sole expense of the Town from the Place du Louvre to the Hotel de Ville, including the opening for the Square of St. Jacques la Boucherie—		
Purchase of land	36,605,854.73	
Making roadway	1,526,613.15	
Lowering the Bridge of Notre Dame	1,439,886.58	
Restoration of the Tower of St. Jacques la Boucherie	828,883.08	
		40,401,237.54
2nd Operation, at equal cost of the State and the Town—		
Purchase of land	17,316,263.25	
Making of roadway	103,237.55	
		17,419,490.80
3rd Operation at two-thirds of the whole cost on account of the State, one-third at that of the Town—		
Purchase of land	21,686,241.37	
Making of roadways	591,629.39	
Levelling the Place du Carrousel	209,946.56	
		22,487,817.32
4th Operation at the cost of one-third for the State, and two-thirds for the Town—		
Purchase of land	26,833,818.82	
Making roadways	944,886.65	
Construction of two houses at the corner of Avenue Victoria	566,483.53	
Indemnity or damages, 3,500 fr. added to No. 1		
		28,348,689.00
TOTAL		108,657,234.66

The products realized from the sale of the surplus land, &c. were:

For the 1st operation—		
Sale of old materials	1,129,407.13	
„ of surplus lands	5,623,924.67	
„ of divers products	261,898.35	
	7,015,230.15	
Properties unsold, 43,325.80 fr., at 33 years' purchase	1,429,751.40	
		9,445,081.55
For the 2nd Operation—		
Sale of old materials	638,605.00	
Sale of land	3,103,427.30	
Divers products	28.843.29	
	3,770,875.59	
Properties unsold, 56,289.08 fr., at 33 years' purchase	1,857,836.97	
		5,628,712.56

	Francs.	Francs.
For the 3rd operation—		
Sale of old materials	511,912.75	
„ of spare land	5,695,287.40	
Divers products	673,934.92	
	6,881,135.07	
Properties unsold, 140,849.40 fr., at 33 years' purchase	4,648,030.20	
		11,529,165.27
For the 4th operation—		
Sale of old materials	907,999.00	
„ of spare land	3,638,479.00	
Divers products	514,569.90	
	5,061,047.90	
Properties unsold, 21,187.60 frs., at 33 years' purchase	669,190.80	
		5,730,238.70
TOTAL		34,133,198.08

Thus the street has cost the total sum of 108,658,000 francs nearly, and it has brought in the sum of 34,153,200 francs; or the total loss upon this operation, supposing it to have been executed at the sole expense of the City, would be about 68.57 per cent.; and it is to be observed, that in order to make the returns as high as possible, I have estimated the whole of the properties unsold *at 33 years' purchase* of the gross rental received from them, without any deduction for the cost of collection, the maintenance in order of the properties, &c. The sum that the State will have to pay will of course depend upon the receipts, after the whole of the property shall have been realized; but if we assume it to be as I have stated, it will be about as follows:

		Francs.
For the 2nd operation	$(17,419,490.80 - 5,628,712.56) \div 2 =$	5,895,389.15
„ 3rd „	$(22,487,817.32 - 11,529,165.27) \div \frac{2}{3} =$	7,315,761.36
„ 4th „	$(28,348,689.00 - 5,730,238.70) \div \frac{1}{3} =$	7,529,816.76
	Total Francs	20,740,967.27
Added to the sum derived as above		34,133,198.08
	Making a Total of	55,374,165.35

This would reduce the cost of the Rue de Rivoli to about 50 per cent. of the gross outlay, leaving out of account the interest of the sums paid in the course of the operation.

The reconstruction of the Boulevard Sebastopol has given rise to very nearly the same result; for we find that it has been driven through the densely peopled parts of the town, between the Rue de Faubourg St. Martin and St. Denis, and so on to the Place du Chatelet. There have been reserved great spaces at the Station of the Strasbourg Railway, at the Conservatoire des Arts et Metiers, and at the point of junction with the Place du Chatelet; and throughout the length of the street it has been established of the width that is considered to be necessary for the principal thoroughfares of Paris. This is equivalent to saying that the width is rather exaggerated, and that the aspect of the street is throughout its length, *monumental.* We find its cost to have been as follows:

	Francs.	Francs.
Land purchased, one-third on account of the State and two-thirds on account of the Town	54,323,410.48	
Works of roadways ditto	2,448,951.32	
Buildings	164,947.50	
Rectification of Cysis of St. Leu	159,047.00	
Inauguration of Boulevard	70,309.00	
Paid to the Caisse des Travaux	1,500,000.00	
		58,648,665.80
Products—		
Sale of old materials	3,187,923.88	
Re-sale of land	18,061,284.02	
Divers products	1,531,939.66	
	22,781,146.56	
Properties unsold, 33,280.79 fr., on 33 years' purchase	1,098,266.07	
		23,880,412.63
		34,768,153.17

The total would make the town a loser by this particular operation of about 60 per cent.; and as the State supports one-third of the loss on it, the City proportion is about 23,178,856.00 fr.; or it must content itself with a loss of about 40 per cent. on the gross outlay for the street, whilst shifting the burthen of the extra 20 per cent. on to the general tax payers of the country. The accounts for the other works are not yet made up in detail, for the works upon them are now proceeding; but there seems to be every reason to suspect that they will present similar results to the above; for they have been conducted on precisely the same principles, and the same disregard to economical conditions as the streets already examined.

For instance, in the works undertaken of late upon the line of the Boulevard Malesherbes, the width that was thrown out, on each side of the roadway, was made just the width of one house on each side, beyond that which was required for the road itself. Beyond that point the streets, on both sides, are left at their natural level, and they are sometimes as much as 20 or 30 feet above the surface of the Boulevard, that is supposed to give access to them. There are the same great spaces left for air, and the enjoyment of the open streets, as we have seen to be the case with the Boulevard Sebastopol, and the Rue de Rivoli; and the communications are evidently designed for a great city, and for the capital of the Arts. They have, however, been designed without reference to the wants of the locality, and they must give rise to still greater expense than has yet been incurred, before they can be made to serve the purposes for which they were intended. In the case of the Rue de Rivoli, there might have been some excuse for the levelling of the side streets; for emphatically that was the leading thoroughfare through Paris, and it serves to place in connection with one another the Tuilleries, the Louvre and the Hotel de Ville; and the Caserne Napoleon may also claim to be considered as a part of the plan; but what could have been the motive for placing the streets abutting upon the Boulevard Malesherbes at such a disadvantage, as they now are, must always be a mystery. The same thing may be said of the Boulevard de Sebastopol, on the left bank of the Seine, for the levels of the abutting streets have also in many cases to be greatly altered, and the open Places near the Palais des Fermes, and the Hotel Clugny, are strangely different from the levels of the great lines of communication. In fact, the principle that seems to have been adopted in designing the works of these Boulevards has been to fix the levels of the two extreme points, and to make the surface of the ground between them on one uniform inclination. This produces great regularity, no doubt, but the sacrifice for the sake of this is enormous; such as, in fact, we can hardly suppose to have been undertaken by a municipality, elected by the general body of the ratepayers,

I alluded in the previous part of this paper to the extraordinary conditions that prevailed in the Rue de Rivoli, that made the operation of driving that street more than usually expensive; and I think the present a good opportunity for recurring to them. In the first place, the houses that were pulled down were densely peopled; they were built in close proximity to one another, like the houses that were in the heart of the city, and in the very centre of business; they were built, of course, upon all the errors of a Mediæval town without regard to hygiène, but with regard to making the most of the surface. The new street was, as was before stated, meant to constitute the main artery of thoroughfare; it was intended to form the line of communication between the various public buildings that it encountered; so that the width of the new street was necessarily very large. There were in its length a number of large open spaces for the disentanglement of the public buildings, such as the Colonnade of the Louvre, the Tower of St. Jacques la Boucherie, the Hotel de Ville, and in front of the Palais Royale; all of which were, in so many words, drawbacks upon the success of the operation, by reason of the spaces of ground they rendered it necessary to abandon. More than half the ground on one side of the Rue de Rivoli has thus been ceded to the public; and if the City, with even this sacrifice, has been able to achieve the street, at a gross outlay upon the expense, equal to about 70 per cent. (exactly 68·57) it must be considered to have conducted its operations very skillfully, and very well.

I endeavoured some time since to obtain a return from the House of Commons for the purpose of forming some opinion on the subject of the cost of such works in London, but their replies to my questions were made in the usual style, that is to say they were contained in a mass of figures so grouped that nothing could be extracted from them. All that I have been enabled to derive from them is that the new Cannon Street cost a gross sum of £589,470., or at the rate of £506. per yard forward; the new Victoria Street cost £330,675., or about £300. per yard forward; but I have not been able to ascertain the proportion the City authorities got back upon those sums by the sale of the ground rents. My own experience in these matters is, however, very considerable, and it has led me to the belief that, unless there be some very exceptional cases, the operation of converting inhabited house rent into ground rent—which is the real meaning of the operation of pulling down houses and re-building them on the assumption that they are parts of town improvements—must always result in loss to those undertaking it. When, as in Paris, wide, straight Boulevards are substituted for narrow, confined streets; when there are, moreover, great places provided tor the recreation of the public, it is not all astonishing that the expense is at the rate of 70 per cent. on the outlay. The State has come to the assistance of the City in this matter; but it can only be by casting the burthen upon the tax payers of the country generally—a course which may be tolerated in a highly centralized country, like France, where, in fact, Paris is everything, and the rest of the nation nothing in comparison with it—but which would hardly be tolerated in England, where we pride ourselves on making every place pay for its own improvements.

Before quitting the subject, it may be as well to say that the expenses of the city of Paris are defrayed by a set of receipts that usually figure in the budget presented by the Prefect under the name of "recettes ordinaires," a set called the "recettes extraordinaires," the "recettes supplementaires," and the "recettes sur fonds speciaux." The recettes ordinaires are made up of the—

	Francs.
Centimes Communeaux	2,693,099.91
Octroi	77,257,065.46
Carried forward	

	Francs.
Brought forward	
Escort of Merchandise	81,873.64
Fines (in octroi)	192,015.26
Octroi on Gas	1,267,464.50
Halles et Marchés	4,463,619.07
Location of places in markets	2,163,778.93
Ditto in markets outside Barriéres	402,996.80
Weighing and measuring	740,635.15
Voirie	540,490.15
Water works	3,656,156.10
Abattoirs	2,146,379.25
Entrepôts	417,931.39
Paid for standing room, &c., cabs, stalls	2,655,465.21
Communal properties, rents of	591,314.19
Expeditions d'Actes	126,991.40
Burials and proceeds of cemeteries	1,195,938.00
Exploitation des voiries (working of cesspools, &c.)	501,285.39
Frais d'eclairage, sweeping markets, contributions of proprietors to works of streets, &c. &c., legacies	8,444,547.04
Drivers' receipts (tax on dogs, &c.)	2,702,670.69
	112,241,717.53
Tax upon burials omitted	295,060.55
Extraordinary Receipts of ordinary Budget	112,536,778.08
Extraordinary tax on the territories united to Paris	233,504.48
Produce of sale of property	659,400.76
Ditto of divers property	376,786.72
Contributions and payment of State	6,128,802.87
Total of ordinary Budget	119,935,272.91
Receipts called "extraordinary," "supplementary" and "fonds speciaux"—	
Proceeds of loan	48,825,212.50
Sale of land beyond lines of street	3,858,038.15
Rents of properties unsold	370,863,60
Divers products	12,574.75
Balance of last year's accounts Interest upon funds at bank	26,805,241.29
	199,807,203.20

This would appear to show that the ordinary budget of the City of Paris amounted to about 112,500,000 francs a year, or about 4½ millions sterling, for which the town, it must be observed, does much that we leave to be done by private companies or by individuals; as for instance, the Abattoirs, Cemeteries, Water Works, &c. The latter branch of the service is discharged in a most disgraceful manner; though the fountains play in every street, the house service is neglected, and water is bought by the pail. It is not my purpose, however, to enter into a comparison of the systems adopted in the two countries, it would require too long a time, and would lead into far too great discussion, touching as the question does on the whole social relations of the population. It may suffice to say that out of the sum of four millions and a half raised yearly, the city of Paris has to pay the interest on the sums borrowed, and the expenses of watching, lighting, paving, sewering and watering the City; and when we reflect that the revenue is principally made up of personal contributions we may easily conceive that the cost of raising it must be enormous. The interest upon the funded debts of the City, at present, is about 10,546,788.64 fr., or £421,871. nearly, an insignificant sum, perhaps, for the two millions of inhabitants of Paris; but it will begin to tell rapidly upon the productive industry of the locality if it be not watched carefully, and checked in its gradual and steady increase. The credit of the City, as was before said, stands very high, but it will suffice for a few more operations, such as the Boulevard Malesherbes, to compromise it very severely.

I may be allowed to say that the Comptes Généraux presented by the Prefect to the town council are models of public accounts. They are clear and distinct—difficult of course to understand at first, like all such documents; but they contain all the elements for an analysis of the separate accounts, such as I have endeavoured to lay before you. I could not have obtained these documents without the kind co-operation of his Excellency Lord Cowley, who facilitated my enquiries by every means in his power, and to whom I tender my sincerest acknowledgments. The Prefect of the Seine, Baron Haussman, I may also add, displayed the greatest politeness in answering my questions and obtaining for me any document I required.

The PRESIDENT, T. L. DONALDSON, having invited the observations of members upon the paper just read:—

Mr. J. W. PAPWORTH, Fellow, inquired whether in Paris a portion of the expenses was not expected to be defrayed by a certain amount of contribution from the owners of the adjoining property; in consideration of its improved value in consequence of these works.

Mr. TITE, in reply, said—that such was not the case in Paris yet. Such an idea had been over and over again proposed. He believed it emanated in the first instance after the Fire of London, when Sir Christopher Wren suggested, that it was not reasonable to make large improvements at the expense of the country, without making the owners of the adjoining property, which was so much improved thereby, contribute towards the cost, a jury of inquiry assessing what they ought to pay. The lawyers, however, argued that it would be an interference with private rights, and that if a boon were so conferred, it would not be just to demand payment for it; and the whole project fell to the ground. The proposition was revived by the late Mr. Charles Pearson, with reference to City improvements thirty years ago, but it was not carried out. If they made a man's house worth three times what it was before, he would be much obliged to them, but they could not make him pay for it.

Mr. ARTHUR ASHPITEL, V.P., thought he could answer that question almost as well as many, having had important business last year in Paris, which brought him into frequent communication with an eminent French advocate and French architect. The system there appeared to be fairer than our own in some respects; fairer on the part of the State both to the company and the claimant. In the first place our law here compels a man whose estate is taken for any public work to send in his claim and set a price upon his own property. That was contrary to our old English notion that a man ought not to be both buyer and seller. In France the law placed this liability upon the other side. The company must send in the amount they will give for the property, and the claimant within a certain number of days must either refuse the offer or take the money, and in case of refusal he must then state what he thinks is the fair value of his property. The great majority of cases there were settled amicably, or what is there technically called *en aimable*. If parties could not agree, a jury is summoned. Much money in what are called "trade cases" was saved in Paris by the endeavours to respect the position of private parties, and where it was possible to reinstate them in new premises, so that they might lose as little as possible in goodwill and expense of removal. They also saved a great deal of money, as he considered, by taking plenty of land in the first instance. With us it was the practice of companies and public bodies to take the smallest quantity of land possible; after the roads were made the several pieces left were so small and of such awkward shape they would not come into anything valuable; whereas in Paris the severed pieces of land were large enough when put together to form a really substantial and valuable property. He (Mr. Ashpitel) put it to those concerned in these matters whether it was not wiser, supposing it to be a railway company, or other public body, in all public improvements to buy more land than they now do, so that they might put the severed pieces together and have something worth selling, instead of little ill-shaped, three-cornered scraps which were of small value. Reverting to the system pursued in Paris—supposing the parties cannot agree a jury was summoned, similar to our special juries. The panel contained seventy-two names, from which thirty-six were drawn, and ultimately sixteen were taken, four others were also taken, technically called "supplementaires," in case of illness or absence of any of the others. They then proceed in this way:—the claimant and the company respectively lay before this jury, in writing, or as it is called by "proces verbal" all the facts of the case, and also the opinions of the surveyors on either side. All this is done in writing. The counsel or avocats next proceed to urge the points that came before them with all the skill they could exercise;* the jury next took their view of the land. There then was a curious difference from the plan pursued in England. The jury in doubtful cases decided that they themselves would call in skilled persons on whom they could rely, on *their own behalf*, to inform them independently on the subject.† It was a singular practice, but did not seem to be an unfair course. It was to be supposed that those called on one side had a bias in favor of those by whom they were engaged, and the same with the other side, and the jury said amongst themselves "we will call in an indifferent man who can give us light on this matter." The law of the 3rd May, 1841, analagous to our "Lands Clauses Consolidation Act," was a short and clear "Loi," but like many of our own "short acts" much litigation had arisen out of it, and much misconception. For instance, juries seem to have got into the error that by calling some person into their confidence they had made him their umpire, and on his shoulders they therefore shifted the responsibility of their decision, but after a short time a decision was given by the courts to set this to rights.‡ The jury were told this evidence was not to *rule* them, but to *enlighten* them, just as a candle taken by a man in his hand to find his way with in places where he could not otherwise see, assists him but does not guide him. They must not take such evidence though called by themselves, so as to be led by the nose by such person, but must exercise their own independent judgment. All the evidence on each side was read in the open court. The surveyors are considered to be professional men, and therefore gentlemen, and were not even sworn to their statements. There was also no cross-examination, none of that brow-beating which was so disgraceful to the British Bar. The

---

* Loi 3me Mai, 1841, Art. 37.—"Le magistrat directeur met sous les yeux du jury—1o. le tableau des offres et des demandes notifiés ex executiv des art. 23 et 24. 2o. les plans parcellaires et les titres ou autres documents produits par les parties l'appui de leurs offres ou demandes."

† *Ibid.*—"Le Jury pourra entendre toutes les personnes qu'il croira pouvoir l'eclairer."

‡ See "Commentaire de la loi du 3 Mai, 1841, par M. V. H. Solon," 8vo. Paris 1850, p. 78, note. See also the "Traité de l'Expropriation pour cause d'Utilité publique, par M. le Chevalier de Lallcaux, Cinquieme Edition, par M. Jousselin." 8vo. Paris, 1856.

French advocate was a gentleman, and would not stoop to bully a witness. There was another difference in the practice which was also a very fair one. If the jury awarded the sum which was offered to the claimant, the claimant pays the whole expenses; if they give the claimant his whole demand the company does the like; but if they gave an intermediate sum, the costs were divided between the parties according to the ratio of that sum. If for instance a man demanded £2000., and the company offered £1000., and the jury gave £1500., the costs would be equally divided. If they awarded £1750. the company would pay three-fourths of the expenses. This system checked extravagant demands on the part of the claimant, and also deterred the company from making unreasonably small offers. He thought the custom of forcing the claimant to put a value upon his own property was a very bad system; every one knew if he put too little a price upon it he could not afterwards rectify it: besides, he was compelled to put a value upon that which he did not like to part with, and was therefore forced to be both buyer and seller. He was, therefore, compelled "to open his mouth wide enough." The counsel on the other side would catch at this and would say "look at this extortioner, look at their extravagant demands," and the jury was influenced by that. It did not seem a fair way between man and man, and he thought in this respect the French method was preferable to ours.

With regard to the cost of these improvements, he had been furnished by his friends in Paris with a large quantity of facts, and had he known that the paper would have touched upon this subject he would have been prepared with some of them. What Mr. Tite said was quite correct, the loss was about 60 per cent. He thought himself the French, however, bought rather cheaper than we do, but not very much, for the reasons before stated. But as to the extent to which these improvements had been carried on in Paris and in London there was no comparison. About fourteen miles of streets are now complete, and about seven more are in course of construction in Paris. That is to say, in narrow streets the houses on both sides and all their back premises are pulled down, and thoroughfares substituted 60, 80, and some 100 feet wide, with noble houses on each side. Let them suppose this to be done from Charing Cross, through the Strand, Fleet Street and Cornhill; through Holborn and Oxford Street with cross streets, or rather main arteries from the great railway stations to the Bank—and they might form some idea of what had been carried out in Paris. Those who knew that fine city about ten years ago would marvel at the change. But now comes the question, who is to pay for the outlay? In Paris he (Mr. Ashpitel) believed the State paid sometimes one-fourth and sometimes one-third of the whole cost. [Mr. TITE, nearly one-half.] What the State paid they had the wisdom to raise upon annuities; and managed matters so that such a street would pay itself—say in 1882, another in 1892; and thus the debt incurred by the State, being raised by terminable annuities, gradually extinguished itself. As to the part of the outlay incurred by the City of Paris itself the argument was this "if we can make finer streets we shall do more business, if we can get finer houses we shall get more inhabitants, and thus the increased revenues, whether by octroi or other dues, will enable us to pay the interest upon the annuities, and these will by degrees wear themselves out and terminate." He should hardly have expected it possible that the City of Paris had a larger income in proportion to its size than London. At any rate the present state of things in this metropolis must be regarded as a great nuisance, and he thought the paper they had heard this evening was the most valuable that they had had within these walls for a long time. It was most valuable as shewing what could be accomplished by men determined to set to work for the good of their native city. Such energy in that respect he had never witnessed elsewhere. Here we had streets of large traffic where only one carriage could pass: in other large streets the thoroughfare was blocked every half hour in the day—a complete "jam." Engineers and architects had laid before the authorities economical and efficient ways of getting out of these difficulties; but it was impossible to do it because of this, that, and the other, and principally of all because there was a want of public spirit. It was not for him at the present time to go into the question whether the government of these matters was best vested in a commissioned body or in an elected board of works; but he would say there was a sad lack of public spirit in London in carrying out improvements, and we might take a salutary lesson in this respect from our neighbours across the Channel.

The REV. RICHARD BURGESS, Honorary Member, said he would not attempt to prolong the discussion upon the cost of making Paris, in a few years, what it has become. Nor could he pretend to say where all the money came from which had been spent upon such magnificence. He remembered when he was in Paris, at the time the Rue Rivoli was in the course of construction, he asked the then Vice-Governor of the Bank of France where they found all the money for these great works. "Sir," he replied, the money is not found yet ("L'argent n'est pas encore trouvè") the fact was that the municipal resources of Paris are provided by the octroi, there was no collection of poor rates or paving and lighting rates in France. The local taxation of the town is confined to a small duty upon all provisions that come within the limits of the octroi, and, in Paris, the annual revenue derived from this source is estimated at about 77,000,000 fr. per annum. [Mr. Tite said about 100,000,000 fr.] He, Mr. Burgess, hoped however that some practical good would come out of Mr. Tite's paper and the discussion of this evening; in whatever way the improvements in Paris might have been effected they put us to shame; for our own metropolis they had but little to show of street magnificence, and they must now act on the defensive to keep the little they had got in any decent manner. It was not more than a quarter of a century since the west-end of the metropolis began to rise in anything like grandeur. It began with Belgrave Square, and it had now partially extended to South Kensington. No doubt we had finer squares and streets now than our forefathers saw. Lord Macaulay told them that in the reign of James II. 1685, Foreign Princes used to be taken to see Bloomsbury Square as one of the wonders of England, and Soho Square was said to have struck beholders with surprise and admiration. St. James's Square had just been built about that time, and there the great mansions of the west-end aristocracy began to be planted. St. James's Square, Lord Macaulay adds, was a receptacle for all the offal and cinders, for all the dead cats and dead dogs of Westminster, and it was not until these nuisances had lasted through a whole generation that the inhabitants applied to Parliament to put up rails and plant trees. But at all events they had improved in that respect. But see how far Paris had gone beyond them; in London if there be a little vacant space, however it might be contiguous to the finest houses, a hundred envious eyes are upon it to get hold of it for every sort of purpose. He had been particularly subjected to that annoyance in his parish of Upper Chelsea. They wanted to get the vacant ground covered with proper buildings, but neither architect nor builder could make any terms. He pointed to the finest parts of London, when he mentioned Pimlico, and those magnificent streets near the late International Exhibition building. They had all hoped that that would have become a splendid west-end of London. Instead of that some of the most unsightly edifices that could possibly be conceived had been erected in the open intervening spaces, and amongst others, a hideous brick building called the Prince's Club; and those buildings, if not removed by act of parliament, would remain to the disfigurement of that suburb of London for the next twenty years to come. He thought this Institute of Architects ought to take up this question and be a sort of police to watch over the London streets and thoroughfares, and protest in the name of the profession against the metropolis being turned literally into a coal depôt. He hoped they would not look upon this as an unmeaning proposition. They all knew what was the effect of the memorial they drew up to get that most extraordinary building of the International Exhibition removed? He believed that memorial to Parliament had really the effect of upsetting the proposition of the Government to retain that building; and if in future they represented in the proper quarter that a set of arches—euphoniously termed a viaduct—was to be carried across Ludgate Hill, or any other similar disfigurement of the City, he believed that representation would be listened to. He should like that a number of gentlemen, whose names would carry weight, should form themselves into a committee of inspection. Of course they would have no legal power to interfere, but they would stand forth as conservators at least of the little magnificence that London possessed. They had representations made at Chelsea of 20 ft. deep cuttings for railways, and his house might be situated ere long by the side of such a cutting, and if he wanted to go from one part of his parish to another he would have to go over one of these bridges, which were promised in the prospectuses to be so elegantly constructed that he would be glad to have such ornamental structures in his parish. Whilst Paris was fast rising into magnificence we were retrograding, and the only pieces of good streets that we possessed were in danger of being cut up by innumerable projected railways, so that we should have nothing to present to the foreigner's admiration except the mere unsightly bulk of our great city. He hoped some practical good would arise out of this discussion. This was certainly the proper body to look after such things; and it was quite competent for them to remonstrate, as they did in the case of the International Building, which still seemed loath to quit its site. In the meanwhile he thought it a practicable thing for this Institute to form a committee to watch these proceedings; and before things went so far that they could not be stopped, to let it be known to the members of the legislature that the metropolis was just now in danger of being disfigured for ever.

Mr. Jennings, Fellow, wished to say one word respecting the question of cost. It was quite clear that these improvements were very costly, and the great question was whether they were remunerative, and whether they could deal with the whole of London as one large estate. If improvements were made over the whole metropolis it did not appear to him an unfair thing to take into consideration the improved value of the total property. The difficulty arose from the attempt to raise money from those individual houses only, which were benefited by the improvement. This was impossible, but if the whole of London were improved upon some general and fixed system, and all the property brought into a more valuable state, it would then pay by its increased value, and the whole would become, as in the case of one estate, a much more valuable property. With reference to the general improvement of the country in connection with railways, he had made a calculation which showed that if they took the increased value of land within three miles of a station, the cost of the railway itself would be more than covered by the increased value of the land.

The President said, he was in hopes that some one would have taken up the question, not merely with regard to the cost, but as a necessity in this metropolis. They were at this time in a deplorable state, from one end of it to the other, and business and commerce were thereby impeded, and it was impossible to go from one part to another with any comfort, or within a reasonable period. He (the President) had mentioned to the Secretaries, that it was his intention to call the attention of the Institute to this subject, and he thought it desirable to follow out the suggestion that had been made by the Rev. R. Burgess, that they should memorialize the Government to appoint a commission to consider how the thoroughfares of this metropolis might be improved and rendered fit for its commerce. It was for them to show the necessities of the case, and that the inconvenience must be removed; also that the means of effecting it must be found. No one could dispute the obvious fact, that considerable losses were incurred every day through the frequent stoppages which occurred in the thoroughfares. It appeared to him, that many new streets were wanted, and the numerous projects now before the public, went to prove that there was a vast necessity for them. As to the question of cost, there was a project of a company on foot, for expending £9,000,000 sterling, in the construction of a sub-way to connect one part of the metropolis with another. It was to our shame as a community that such a state of things should be allowed to continue, if a private company could lay out such an amount as that (he understood they had

£850,000. ready to deposit in accordance with the Parliamentary regulations) upon what was only a private enterprise to satisfy a mere local necessity, which was but a minute part of the entire necessities of the metropolis: not merely one, but at least a dozen such works were required. Coming from South Kensington for example, how did they get to Charing Cross? and how to Waterloo Bridge thence? It was one of the most indirect and tortuous routes that could be imagined, as also was that from the end of Oxford Street to Charing Cross. Again, coming in the same direction from the London and North Western and Great Northern railway stations, the necessity for more direct communication with the Thames from those points was most apparent. Then again how did they get from Shoreditch to Waterloo Bridge? Why should they not have a street going direct from Shoreditch Church to Waterloo Bridge, with a branch to London Bridge? They wanted new means of communication from north to south as well as from east to west. If our Government would lay down a system of that sort—and the necessity for it become daily more and more pressing—there were vacant spaces at present existing which might be taken for the purpose. Unless it was done forthwith, it would be almost impossible to do it a few years hence. If Government laid down a scheme for these improvements the question of money must follow as a matter of course. Alteration in these respects was a dire necessity, it was not possible to exist without such being carried out; matters had arrived at that point that Government must undertake such a scheme, and then if there were any private companies that wanted communication from one part to another, they might be made to subserve these great lines of communication, and come in to bear part of the expenses. It was for them as an organised Institute of Architects, to go before Parliament and submit to them a scheme of the kind described, and to memorialize the Government to appoint a commission, and to hold in suspense those railway and other public projects in the metropolis, until a proper and comprehensive scheme was laid down, not for the benefit of this or that company, or for individual or speculating parties, but for the general convenience of the metropolis. With respect to the subvention of Government towards these projects, he held that a Government ought to come to the assistance of a great metropolis like this; nor should such aid be restricted to the metropolis, but extended to every city throughout the kingdom, and he was quite sure that if this was done, the progress of public improvements in this country would be very remarkable. He (the President) had been at Leeds last year, and had found that nothing could be worse than the thoroughfares of that town. Local parties in such places were only partially interested in the matter; tenants had such short leases of their occupation, that they would not put themselves forward to carry out such improvements, but they would do so if they were assisted by Government. When they regarded London as the great Metropolis of the country, and looked at the fact, that the great obstructions of the thoroughfares were chiefly occasioned by the confluence of strangers, the country at large ought to contribute something to that which would facilitate public business. He (the President) now proposed that a day should be appointed in January, for considering the question of an application to Government, and pressing this subject upon their attention without further delay, rather than leave it to be done in the partial, imperfect and defective manner in which he conceived it would be carried out by the various companies which now had projects before Parliament.

Mr. T. H. Lewis, Fellow, said that if, as he hoped, the committee should be appointed as proposed, he trusted that they would be allowed to avail themselves of a most comprehensive scheme for the improvement of London in every part, prepared by our Fellow, Mr. F. Marrable, who, when superintending Architect to the Metropolitan Board of Works, had carefully considered the subject, and laid down a very elaborate plan not only of the main lines of streets which are required to be improved or newly formed, but had made many valuable suggestions as to other minor improvements which would be likely to escape any one not so necessarily conversant with the subject as Mr. Marrable. The scheme would be of great service to the Committee, and he hoped that they might be favored with the use of it.

Mr. **Marrable**, Fellow, said he had great pleasure in seconding the proposition of a vote of thanks to Mr. Tite, and added in reference to the suggestion of Mr. Lewis, as to the advisability of some comprehensive plan for Metropolitan Improvements being prepared under the auspices of the Institute, that he had by the direction of the Metropolitan Board of Works prepared such a plan some few years ago—that after carefully examining all the Parliamentary Blue Books on Metropolitan Communications he had selected such plans as seemed best calculated to work well together towards a general improvement of the Metropolis, and he had added many suggestions of his own, so that a comprehensive system was arrived at and laid down on the large scale Ordnance Map. The map was laid before the Board, with an approximate estimate of the cost of the several improvements which amounted in the whole to £19,000,000. The members of the board were frightened at the amount, and the plan was laid on the shelf, but probably it still existed in the strong rooms of the board. The boldest portion of the scheme was the widening of Cheapside; but as it was also proposed to improve Holborn Hill and increase the traffic in that direction, and to open a new thoroughfare through Paternoster Row, across Farringdon Street, Carey Street, &c. to Regent Street; to remove Temple Bar, and carry a new bridge over the river at St. Paul's, he thought it would be bringing too many main arteries to one point, without widening Cheapside, through which all the increased traffic must pass to the Bank, Royal Exchange, &c. Mr. Ashpitel had remarked that public companies did not take enough land, and argued that by taking additional land they would recoup themselves. He did not agree with that. It was like the old sum—"if a herring and half cost three halfpence how much would three cost?" They might get one acre of land for £1000., and the next acre might cost £2000., merely from the difference of locality. He therefore questioned the economy of taking more land than was necessary for the street they desired to carry through it. They must have sufficient building depth, but if they took more it was a loss. In the instance of the new street in the Borough, which he in a great measure carried out, he was careful not to take more land than was necessary, but generally speaking it was enough. In one or two points he was rather pinched in the avoidance of important property which would have cost a large sum and produced but little ultimate return. His own experience led him to the conclusion that it was advisable to take as little land as possible. From the devious lines of property they were necessarily obliged to have a good deal of surplus—some deeper than was required, whilst some was not so deep as was wished. Mr. Ashpitel had also referred to the method of compensation adopted in Paris. He (Mr. Marrable) was not sure that it was a better plan than our own. In such cases the chances were that a government surveyor would be engaged by the jury, and whether he would hold the scales evenly he could not say. He thought the system of arbitration was, generally speaking, the best. He did not think a jury a good tribunal in such cases, because they had twelve men who were obliged to hear conflicting evidence, and their ears tickled with high-flown speeches from counsel, and after sitting five or six hours their mind and body were fatigued, and they were only too anxious to get rid of the whole affair; and it might be that they would take the highest figure given by the companies' surveyors, and the lowest on the part of the claimant, add them together and divide by two, which would be their assessment. He therefore thought a jury was a most incompetent tribunal to try such conflicting cases, the speeches of counsel only serving to obfuscate their ideas a little more. But with a skilled man acting as arbitrator, who could, if he pleased, reject all the evidence and act upon his own opinion, and bring his own professional mind to bear upon it, he believed they generally arrived at something like the real value, and he did not think that system could be improved upon.

The vote of thanks to Mr. Tite having been carried by acclamation,

Mr. Tite, M.P., said as it was probable he could not be present at the next meeting in January, he would embrace this opportunity to say that the necessity for these improvements was admitted on all hands, yet the great difficulty was how to pay for them. The late Richard Lambert Jones, who did so much for the city of London, on one occasion, laid before the Duke of Wellington a plan for some improvement which his Grace admitted was a capital scheme, but he went on with the following anecdote, having reference to this very important question of means—his Grace said, that it was the custom of the vestry at Strathfieldsay to dine together once a year—but when it was first proposed, one of the party, a wise old farmer, stood up and addressing his Grace said "its all very well my Lord Duke, but before I eats this dinner I wants to know who's to pay"—it was all very well to talk of grand schemes of street improvements: but let any man get up in the House of Commons and propose to pay for such schemes out of the consolidated fund, and he would only be laughed at. The members for other cities and towns always said "we do not ask you to make our public parks or pay for our public improvements," and he feared there was no chance of the general finances of the country being used for the purposes of London only; and looking at the large amount of rating due to the Main Drainage, the Thames Embankments, the New Street to the Mansion House, he could not suggest any means by which further improvements could be paid for. As to the wild speculations of railways spoken of there was no money of the public or any real company, he believed, in any one of them; and the money spoken of as deposited was generally borrowed and guaranteed by some astute lawyer, or speculative engineer, and the projects themselves were only the speculations of contractors, engineers and solicitors. With regard to the question of the English mode of managing compulsory purchases, nothing could be worse than the present system. A jury was a reasonable process, but at a comparatively recent date the legislature had allowed claimants to choose an arbitration if they thought fit; no doubt the arbitration was intended as less expensive and tedious—but the mode at present adopted was most costly, mischievous and ridiculous. It was this, the surveyors appointed on both sides met and appointed an umpire—suppose the President or some first-rate man—a day was named for a meeting when two counsel on each side and half a dozen witnesses (not to matters of fact but of opinion) and this process was continued sometimes for days, to settle questions which half a hour's quiet talk of the arbitrators and umpire might have easily and economically determined. £6000. or £7000. in expenses had often, he believed, been the cost of such enquiries. He, Mr. Tite of course did not deny there were cases in which really honest difference of opinion might arise, and care and thought, and consequent expense must be incurred; but what he complained of was that the process he had described was employed as a matter of course, and for the simplest cases. He liked the French system much better. In the Paris and Rouen Railway the counsel for the company, Mons. Baud, bought all the land. When it was necessary to go before a jury he did so, and he, Mr. Tite, was once present: after all the documents and valuations had been read before the court and jury Mons. Baud pulled out his watch, laid it on the table, and said he would not occupy the jury more than twenty minutes. He described the whole state of the case—this paper shewed this, and another paper shewed that—and after twenty-two minutes speaking he said to the jury "now, gentlemen, I have kept my word as to time, and you will now be good enough to say what the company have to pay!" To return, however, to the subject of the paper, he hoped something was doing and would still be done for the removal of the reproach which existed even before the Fire of London, for Evelyn in describing in his diary his passing through the City before that event in going to visit St. Paul's, then, perhaps, the finest gothic building in Europe, thus wrote, "I could not help feeling as I wandered through the crooked and crowded streets that it was the ugliest city for its bigness in Europe," and he (Mr. Tite) did not think they had hitherto done much to redeem it from that reproach.

NOTE.—Mr. J. W. PAPWORTH, Fellow, points out that under the head of "De l'expropriation pour cause d'utilité publique," by J. Nourrigat, Architect, in the Révue Générale, 1863, xj. 179—210, will be found full particulars of the system of compensation referred to in the above discussion.

ANNOUNCEMENTS AND OCCASIONAL PAPERS.

COPY OF A LETTER from the Rev. Henry Thomas ELLACOMBE, M.A. Oxon, F.A.S. Rector of Clyst St. George, Devon, and Contributing Visitor; read at the Ordinary General Meeting of the Royal Institute of British Architects, held on Monday, the 4th January, 1864; containing information relative to Bell-ringing, &c.—in reference to the Paper on Newland Church, by W. WHITE, Fellow, read at the Ordinary General Meeting, held on Monday, the 30th November, 1863.

To JOHN W. PAPWORTH, Esq., F.R.I.B.A.

DEAR SIR,

I have been very much interested in your discussion with Mr. White, about the Bell Ringers' place, after his very able though somewhat pertinacious paper on Newland Church, as reported in the Sessional Papers of the Institute, Part I, No. 3, pp. 40 and 41, of the present Session. I have long contended for bringing the ringers down, *ad pavimentum et in conspectu ecclesiæ;* they and churchwardens may make difficulties, but there are few, if any, but what may be got over by consulting those who know how to make the arrangement. Here we have a very beautiful western Doom by Hardman, after Giotto's design, and the ropes and guides *do not at all damage the view.* The guides are iron bars, 1 inch square, opened where required to embrace a 2½ galvanized *thimble;* one end is let into the wall, the other screwed against the opposite side. The 20 feet noticed by Mr. Christian as the length of the pull must be a mistake for the distance from the floor to the first guide. I think Mr. Denison gives 16 feet, but here the distance is 18 feet from the pavement to the first guide, and (46 feet 9 inches, say) 47 feet from the pavement to the top of the wheel of the tenor, and 53 feet to the top of the wheel of our Albert Memorial bell, for that is hung above the others. There is no difficulty whatever in the *pull;* I speak from experience, for I ring generally once a week. I inclose a copy of a paper of mine on Bells, published in the Ecclesiologist last year, in which I allude to the point at issue: and also a Paper by "A Cantab. M.A." in the last Ecclesiologist.

With all respect for the professional members of the Institute, I would beg leave to suggest that architects in general would do well to avoid having anything whatever to do with the arrangement of the bells, or procuring them, or hanging them: all they should do is to take care that a substantial oak floor of 2 inch stuff (to be laid, *when required,* on beams and joists of the same material of substantial scantling, not less than 8 ins. square for joists, and 12 ins. for any beams, the ends to rest on corbels, or, what is better, on a set off of 10 or 12 ins. all round) be provided for the bell chamber, such as will be found in all old towers; and it would be better not to arrange the timbers, nor consequently lay the flooring planks, until the bell-hanger has been consulted as to the size and exact spot he will require the trap to be left; there, wherever it may be, one or two trimmers will be required. I would almost defy any architect being able to do credit to his abilities, or any general contractor to carry out honestly the requirements, without a previous consultation and understanding with the bell-hanger; by so doing both parties will get rid of a deal of worry, which per-centage and profit will barely counterbalance, and the employers will be better satisfied. In bell hanging so much has to be done *pro re natâ,* that it is often most difficult to foresee all the details connected with the setting up and completing a peal of bells (and the more so if there are chimes and a clock to contend with): all that should be left to the bell founder, or bell hanger, as the case may be, for different parties may be employed; and either is the proper party to construct the cage for the bells, independent of the general contractors. It seems to me that an architect and a builder might just as well design and manufacture the steam engine and power looms, or other machinery to be set up in a mill they had constructed, though they would of course have taken instruction before hand from their employer or the mechanician as to requirements.

In modern towers the general complaint is, that the bell chamber is not sufficiently capacious, though the very object of a tower is for the purpose of receiving a peal of bells; therefore that (capaciousness) is a point that the architect should insist upon carrying out. It is a great mistake to suppose that bells may be hung one above another, and squeezed in any how: they *may* be it is true, but not with any satisfaction to those who have to pay the cost, nor without great inconvenience, and increase of expense, and very great danger to the permanent stability of the building. Another complaint I have heard is, that in modern towers the ringing floor is often placed close under the bells; and that, in some, the stone staircase is carried up close to the bell chamber, taking up a large portion of the area required *inside* for the bells: it is far better to stop the staircase at the lower floor, and thence have a ladder leading to the bell chamber floor, entering one of the pits of the cage.

In the tower of this church, the walls of which are 3 feet thick at the bell chamber, 11 feet by 10 feet 6 inches, and 5 feet at the base, 9 feet by 8 feet, we have six bells all well hung, and in a substantial new cage of oak. The ropes of three pass through the very heart of the clock, in metal tubes, and one of the ropes is conducted to the floor through a trunk as crooked as a long *ſ*, and inclining as much in the other direction; to do that was the work of a mechanic, and such as no architect or building contractor should have anything to do with.

Will you do me the favour to lay these remarks before your next meeting; experience in the subject of over half a century induces me perhaps to make them with the more pertinacity and freedom of speech; but they are made with genuine Christmas goodwill to all, and I trust will be received in the like spirit, and oblige

Your's obediently,

H. T. ELLACOMBE, M.A., Oxon., F.A.S.

Rectory, Clyst St. George,

St. Thomas's Day, 1863. *Topsham, Devon.*

P.S.—I have three or four towers in my eye in the remarks I have made: in one every timber fixed by the architect for the bell work had to be hacked and cut away; in another the whole had to be removed.

When I took out the old cage here, there was proof enough, by the *pointing*, that the cage was fixed before the walls were raised: but in those Mediæval days they rarely had more than three bells in parish churches; it is the increase of number of bells that makes the arrangement more complicated. In Gloucester Cathedral there is proof that even the stone groining of the tower ceiling was not executed (finished) till after the bells were raised to their chamber; and so I say timbers should not be fixed till all about the bells is settled. Towers are for bells, and therefore their requirements are to be uppermost in the mind of the architect, and therefore plenty of room and strength should be provided, as well as plenty of opening for sound.

ANNOUNCEMENTS AND OCCASIONAL PAPERS.

MEMOIR OF JOSEPH WOODS, ARCHITECT, HONORARY MEMBER.

Read at the Ordinary General Meeting of the Royal Institute of British Architects, January 18, 1864.

GENTLEMEN,

I have to announce to you the departure of a gentle spirit; of one, who may be regarded as a Patriarch of our profession. I mean of Joseph Woods, our honorary member, the editor of the fourth volume of Stuart's 'Athens,' the author of the 'Letters of an Architect from France, Italy, and Greece'—professional works of considerable importance, and which will always secure him a leading position in the annals of our art. He was a man not so much of active as of thoughtful reflection; and yet, notwithstanding, the calm even tenor of his philosophic life carries with it many a lesson, and these lessons should not be lost to us, who survive him. His parents were Quakers, and his father was a merchant in a considerable line of business, a man of high honour and integrity, so that the goods furnished to his correspondents abroad were proverbially relied upon as of the soundest quality, and of ample measurement. His mother was the daughter of Mr. Samuel Hoare, whose son Samuel became the senior partner in the banking house of Hoare, Barnett, and Co., Lombard Street; Joseph was the second son of his parents, and was born at Stoke Newington, on the 24th of August, 1776, and at eight years of age commenced his education, which he himself considered as very deficient, owing to the want of good schools among the quakers. He mentions, however, in a brief memoir which he wrote, that he passed one year at a day-school in London, kept by a Mr. Lord, and this was the only efficient schooling he had. This seems the more remarkable, for, as he was obliged to leave school at thirteen or fourteen years of age from ill health, it is evident that he must in future years have made up for the deficiency by intense self-instruction, as he subsequently became proficient in Latin, Greek, and Hebrew, besides the modern languages French, Italian, and modern Greek, in which he was able to converse familiarly; and this devotion to literary studies must, doubtless, have been greatly promoted by the highly classical and antiquarian pursuits of his father, who was a frequent and gratuitous contributor in Latin and English prose and verse to the 'Monthly Ledger,' the 'Gentleman's Magazine,' and other like publications. In order to recruit his strength and re-establish his health by sea-bathing, he was apprenticed at sixteen to a party at Dover; and here it was that he was induced to join some of his London relations in the study of botany, as a pleasurable occupation. He, however, subsequently took it up more seriously, and became confirmed in his passion for the pursuit and for natural history by an introduction to the breakfast-table of Sir Joseph Banks. His health and strength being re-established, and finding his commercial avocations uncongenial, he yielded to a natural inclination, which he had for architectural design, and placed himself with Mr. Alexander the Architect of the West India Docks, and who was largely engaged in carrying out various considerable works in the metropolis and elsewhere. We have nothing to guide us as to the mode in which he followed up his new profession. Mr. Alexander was known for his practical, rather than for his artistic skill; but doubtless the literary tastes of the young architect led him to study the works of Sir William Chambers, and Stuart's 'Athens,' the third volume of which had appeared about that time; and both these works, admirable in their several ways, occupied the attention of professional men, as educational guides and authorities. Upon quitting Alexander, he must have entered upon business for himself. It is a remarkable circumstance that, born and bred as it were in an atmosphere of trade, with all his connexions engaged in commercial pursuits of one nature or another, he himself confesses that he had an entire misapprehension of the nature of business. In fact, he was more of the literary and speculative, than of the practical man; in the many pursuits he followed, he always was analysing facts or the impressions upon his own mind, and endeavouring to reduce them to a coherent theory. He was ever a great reader, and made himself master of the history of those countries connected with his immediate pursuit, and the characters of the peoples, in order to be able to account to himself for the physical and intellectual influences, which may have controlled the various phases, which architecture has assumed from time throughout the civilized globe. And, although he never estimated his abilities at their full worth, yet he felt within him the consciousness of a power, which, despite a fluctuating state of health that never allowed him absolute freedom from irksomeness or suffering, enabled him to undertake engagements for which other feebler minds might have shrunk.

When he was about thirty, he with Aikin, Busby, Beazley, Elmes, and other earnest young men, established the London Architectural Society, founded in 1806, for mutual improvement, by discussion and writing essays; and he contributed several, on various topics, to the society, which evinced his usual love of analytical investigation and theoretical generalization. Two, with the following titles, appear in the first volume (1808), 'On the Situations and Accompaniments of Villas,' and 'On Dilapidations.'

These, of course, naturally met the eye of Mr. Taylor, the architectural publisher and bookseller, for about 1814, he made a proposition to Joseph Woods to publish in a volume the remaining documents of the deceased Athenian Stuart, as a fourth to the preceding three on the 'Antiquities of Athens.' In his preface, Mr. Woods remarks, that it had been the singular fate of the work, that only the first volume was published by the author, and that each succeeding one had been ushered into the world by a different editor. The first appeared in 1762. The second bears 1787 on its titlepage, but was not published till after Stuart's death, which happened in 1788, when the arrangement was completed by Newton. And in 1794, Mr. Revely appears as the editor of the third. After a further interval of twenty years, the papers were put into his hands, and thus he was enabled to offer to the public the fourth volume in 1816, just fifty-four years after the publication of the first volume by Stuart himself. Most of the materials had been already prepared by Stuart and engraved, as he had intended the illustrations of the Pola Buildings to have formed part of the second volume. Mr. Woods, however, had to select from a vast mass of crude materials of more or less interest, and some of them very imperfect and so to make up the matter for a complete volume. This he did with great judgment, by rendering more complete the series of the sculptures of the Parthenon, selecting many choice fragments of attic art, and the curious oxhead details from Delos, &c., all rendered with the care and delicacy of the original work. With like scrupulousness, he availed himself of Stuart's own manuscripts and chance notes, adding little of his own, except in direct explanation; and with a modesty and self-negation characteristic of the man, ascribing all merit to Stuart alone, and abstaining from bringing forward the personal researches and labour, which must have been required by so difficult a task.

It was about the time, when he was engaged in the publication of this volume, that he must have been employed to prepare designs and carry out the works for the Commercial Sale Rooms, in Mincing Lane. The elevation is one of the most striking in the city of London, and although situate in one of the narrowest thoroughfares of one of the most out of the way parts of London traffic, no passer by can resist the impression, which its simple character and noble proportions produce on the mind of the observer. The entrance floor is simply channelled, but the principal story consists of a series of Ionic columns, boldly projecting and as boldly profiled. It was a fine result of his study of Grecian monuments, and shows that, if he had ultimately followed his art with the like impressions and the like sobriety of treatment, I might have had to quote many other monuments honourable to his reputation as a man of taste. On the first floor was a spacious meeting room, calculated for the assemblage of large numbers of persons and of considerable span. Wrought iron was then coming into notice; and I think that Rondelet's *Art de batir* must have been familiar to him, as it contains many examples of the use of wrought iron principles and tie bars calculated for such occasions. Mr. Woods, nothing doubting the tensile resistance of the material, and possibly too closely calculating the results, rendered his ingenious trusses for the floor too weak—a failure occurred; the whole question was referred to arbitration, and although defended by the zealous advocacy of his attached friend and admirer, the late Mr. Hardwick, senior, he was hardly dealt with, and obliged to make good the defective construction at his own cost.

This was a severe blow to his sensitive mind, and he felt it most intensely. And the fall of Napoleon having opened the Continent to English travellers, and being possessed of means sufficient to satisfy his moderate wants, he determined to avail himself of the opportunity to study the best examples of architecture in foreign lands, intending to resume the profession of an architect on his return.

He was then forty, and he states in the preface to the 'Letters of an Architect from France, Italy, and Greece,' a work which was the fruit of his travels between April 1816 and May 1819, with some additional information acquired in 1820, the reasons which induced their publication. "Many professional works, treating on the architecture of Italy and Greece, of greater or less excellence, have been given to the world; but I do not know that there is any one in which the author, after examining the most celebrated edifices of ancient and modern times, endeavours to explain to what circumstances they owe their power of pleasing, and what are to be considered as defects, tending to diminish that power. The subject has been slightly and incidentally touched upon by more than one traveller, but not treated with that care and detail, which it deserves. To the architect it is of the *greatest* importance; it is no less than the knowledge of what he is to shun and what to imitate; by what different modes of building he can produce the same effects; or how, by methods nearly similar, he can produce different effects. In short, in what manner, with means always in some degree limited, either by the nature of the material to be employed, the customs of the country, the expense, or the taste or no taste of the employer, he can produce BEAUTY. The plans and details of a great many edifices have been measured with care and published with considerable accuracy; and, knowing the original building to be beautiful, we copy and re-copy its parts without considering whether all the particulars conduce to the same harmonious effect, or whether those forms, which please under certain circumstances, may not displease in others. Nor are we entirely free from the danger of neglecting that character and propriety of ornament, on which the beauty of the whole must in some measure depend. In all the fine arts, but particularly in architecture, the eye is frequently pleased without our being able to explain why, and this *why* has sometimes escaped in the drawings and measures, which have been published of the edifices. This connexion of cause and effect is then the great end and object of the architect—the completion and consummation of his studies; and this it is the object of the author of the present work to explain, as far as his abilities and opportunities will admit.—A person who thus criticises every fine building which he sees, without vanity or presumption, with a sincere desire to find out whatever is excellent, and to understand and fully enter into the reasons for any admiration, which has been generally bestowed upon it by others, yet at the same time not blindly following authority, but bringing everything to the test of his own feelings and judgment, will form to himself a habit profitable, not only when applied to architecture and the other fine arts, but in every subject on which the human understanding is exercised."

Many of the earlier letters were addressed to our Fellow, Mr. P. Hardwick, to whom he was deeply attached, and who possesses some of the original MSS., and others were written to persons more or less familiar with architecture. Whether describing the monuments of art, the customs of the people, politics or religion, he discusses all with a calm, impartial and unimpassioned spirit; for although deeply impressed with every object he saw, he never allowed any intensity of impression to mislead his sober judgment. It is the same philosophic mind and lucidity of perception, that directed his descriptions and matured his judgment on the architecture of the various countries through which he passed. Imbued as he educationally was with the purity and sublime beauty of Grecian art, he still had admired and reverenced the impressive grandeur of Mediæval buildings in England. He was no bigot. He would never, with intolerant perverseness, have stigmatised our cathedrals as the mawkish productions of ill-directed fancy, nor slandered St. Peter's at Rome as a heathen production. He had too much reverence for the noblest efforts of the human mind in every period of the world's history to treat with contempt what must have been the grand productions of the highest intellects in all these several times and countries, however different they might have been from his own convictions and ideas of the beautiful. Throughout he generalises his observations, and seeks to form some broad principles of composition, as to arrangement, proportions, or decorations of buildings, or the distribution of light and shade. He passes in review the most remarkable buildings, ancient or modern of all styles in France, Italy, Greece, Turkey, and Sicily, and makes his remarks on them in the most simple and unaffected manner, never seeking to enhance the subject by ambitious language or high-flown sentiment; all is calm and tranquil, yet firmly treated with simple truth. His pages teem with maxims of precious meaning, and he treats on every subject connected with our art, including his ideas for the studies of the architect and the best system of architectural education.

Patient, painstaking, and laborious, as far as his infirm state of health would permit, he never allowed an idle hour to pass. He had his relaxations as a duty to his constitutional weakness and not from idleness. He amused himself with the lighter literature of the day, and even in his recent memoranda, had noted that he would purchase a series of Scott's novels. His favourite pastime was chess, which, perhaps, was the only pursuit that thoroughly absorbed his feelings. He had acquired such a mastery in the game that few could cope with him. I remember, when at Rome, in 1819, he and I strolled into a coffee-house near the Antonine Column, where a chess club usually met. We were casually looking at the games being played, when some one came up and asked him if he would accept a challenge; he did so, and beat his antagonist, who was not very powerful. But a stronger player presented himself, and he soon checkmated him. Then, with like success, a more powerful one, and any who chose to try his chance with my friend, and we left them all in a stupor at the stranger's skill.

On his return to England, he took chambers in Furnival's Inn, and his great occupation for several years, that is, till 1828, was the preparation of his letters for publication, and in truth it was his last professional effort. He felt himself, in fact, from ill health unequal to meet the battle of business life, and being sufficiently independent in means for it not to be absolutely necessary for him to resume the profession of an architect, he at last with considerable reluctance gave up the idea, sold off his books and main collection, and in 1833 retired to Lewes to reside with his maiden sister, and where, as he predicted, his life was concluded.

During the remaining years of his existence, his chief pursuit was botany, which, while it induced him to go much into the air and take exercise, for the collection of specimens, also contributed to his health. He two or three times took trips again on the continent, in connexion with this pursuit, and he compiled a most useful work, but completely of a technical nature, which he called the 'Tourist's Flora,' published in 1850, and which is considered a great authority on the subject. His name is intimately connected with the rare and beautiful ferns—which he discovered—*Woodsia hyperborea* and *ilvensis*, a very distinct genus, and so named in compliment to him by Mr. Robert Brown, many years President of the Linnean Society. He was also a very good geologist, as is evident from the allusions he makes to the subject in his 'Letters.' He was a careful and accurate draughtsman, which was of inestimable use in his botanical illustrations; elaborate in the exquisite pencilling of his views, which were generally taken from the most favourable point; but he was not so successful in colouring, and frequently was deficient in vigor of chiaroscuro. Even up to the last week of his life he occupied himself in re-examining the memoranda and sketches of years long past, and finishing off some of the drawings that still remained incomplete; or in revising his notes and journals, leaving also several essays written on various architectural topics. He frequently referred to specimens of plants, to which he was continually adding; and thus, by corrections and additions, he was preparing for another edition of his 'Flora,' which was considerably advanced.

There was one point particularly attractive in his character, and that was his partiality for youth. He attached himself readily to any young man earnestly and modestly engaged in his studies. He would assist him by his advice, not dogmatically, but simply kindly given. He would read with him and open up all the stores of his varied experience. He would correspond with him, if absent, and take the greatest interest in his success, and happy are those who in earlier times have been encouraged by his approval and guided by his counsels, and had grown up to enjoy the privilege of being the cherished companion of after years.

I received a letter from him only six weeks before his decease, in which he says: "In point of disease, I am better now than I was forty years ago, and can even do some things better now than I could then, otherwise I should not have run my head against such a job as I am now employed upon concerning *Brambles*" (another botanical subject for his 'Flora'). "Indeed I began intending a few short observations, but, as in many other cases, the work has grown upon me as I proceed, and I do not like, after having spent so much time upon it, to give it up until I have seen whether I can do anything towards settling some very disputed questions." And again he says: "I can get no bookseller to publish my architectural essays, and I believe I should publish on my own account if I knew any good bookseller who gave himself up to that, rather than publishing on his own account. But I am not inclined to take much trouble about it, and the world will have probably to submit to the irrevocable loss."

Throughout life he was in the habit of keeping a regular diary of his impressions, and of what he did, and a record of the symptoms of his ailments, and he had also a regular system of reading and occupation for each day.

The last words in one of his journals, written in a fine clear hand, about two years ago, are these: "Now in my eighty-sixth year I experience considerable diminution of muscular strength, and I find myself incapable of continual exertion either of mind or body. But I have great reason to be thankful for what I still enjoy. I want no physical comfort. I have a loving sister and kind friends. I have little pain of any sort, and my mind seems to be perfectly clear." And thus, on the 12th of January, 1864, in his eighty-eighth year, in his own study, and seated in his chair, passed away this calm beautiful spirit without a struggle, his hand clasped in that of his loving and beloved sister, with a Christian character respected by all, and most loved by those who knew him best.

THOMAS L. DONALDSON.

RECENT EXCAVATIONS AT ATHENS.

A COMMUNICATION to the Hon. Secretary for Foreign Correspondence, from Signor Lysandros Kaftangioglu, Hon. and Corr. Member, dated Athens, December 25th, 1863, states that the excavations in the Theatre of Dionysius (Bacchus) by the Archæological Society have, after some interruption from recent events, been almost terminated. They have, however, brought to light hardly anything beyond the remains of a restoration of the Roman epoch, and not even a detail of the original Greek architecture.

But what had been discovered is more interesting in an archæological point of view, viz., numerous inscriptions, which have been published by the society. The most valuable are those shewing the destination of the seats, a great number of which were assigned to the priestesses of Bacchus. Fragments of colossal statues and a mutilated bas-relief, the statue of a youth, and two Satyrs almost of colossal size, but all of the Roman epoch, are the only remains of sculpture.

The excavations in the Gymnasium of Ptolemy, have also produced some very interesting inscriptions, which have been published. Among others, one on an architrave contains the name of Attalus; in consequence of which, the building, hitherto known under the name of Ptolemy, will henceforth be better called the Portico of Attalus. Among the various fragments, are the remains of a primitive Doric monument of Piraic stone, on which very distinct colours have been observed. Unfortunately, further researches are indefinitely postponed, in consequence of the modern dwellings which encumber the site. Recently, several tombs have been accidently discovered *in situ* near the Ceramicus, at the supposed entrance of the Dipylum. They extend under the hill of the Holy Trinity (Agia Triada) near the little church of that name, which separates the two roads now leading from Athens to the Piræus. Besides their topographical interest, they possess that of colour, in many instances. The most worthy of attention is that of Denilos Lysanios of Thoricus, a bas-relief representing a mounted warrior riding over a vanquished Spartan. It is assigned to about the year 394 (B.C.), and is apparently mentioned by Pausanias, (Att. 29). In the same place, have been found the fragments of an ox, life size; a Molossian dog; a bas-relief representing a mortuary repast, not of much value; a figure of a Syren playing on the lyre; the headless statue of an Archon (interesting on account of the dress, and of traces of colour); and numerous Stele of different forms. All these monuments appear to have been formerly partially upset, and then restored: after which time a second hostile inroad caused their present state of confusion.

In building a small museum on the Acropolis, to contain objects found *in situ*, at the Eastern end of the Parthenon, have been found traces of foundations belonging to other ancient constructions; also a fragment of a statue of an early epoch, and many interesting objects of terra cotta.

Notwithstanding the present critical state of the country, the members of the Archæological Society have not relaxed their endeavours, so far as their means allowed, to prosecute their researches.

Of modern works in Athens, the most interesting are the Academy, built at the expense of M. Sina, a Greek banker, at Vienna, on the plan of M. Hansen, of Pentelic marble, the architecture highly enriched Ionic, the sub-basement of Piraic stone, after the ancient manner,—and another large edifice, consisting of several corps de bâtiments, intended for the School of Arts, after built M. Kaftangioglu's designs, under his direction, in which marble from ancient quarries has been used. A projected railway from the Piræus will, it is feared, interfere much with the quarter of the city adjoining the street of Mercury, and of Minerva, in which very many interesting remains of antiquity are situated. The Roman Catholic Church of St. Denis has been nearly completed, with the exception of the portico, in accordance with the design of the Chevalier Klenze. * * *

ANNOUNCEMENTS AND OCCASIONAL PAPERS.

LEO VON KLENZE.—NECROLOGY.

In Leo Von Klenze, who died on the 27th of January last, has not only Bavaria, but also Germany, lost one of its greatest Architects. Gifted by nature with acute understanding, and a rare sense of the grand and the beautiful, he made himself, by assiduous diligence, master of a most abundant store of information in all branches of human science, and ranked, without doubt, among the foremost connoisseurs of classical antiquity.

Klenze was of a Mecklenburgh family, which emigrated into the Harz, and became possessed of landed property. His father was a law-officer in Hildesheim, where Leo von Klenze was born, on the 29th of February, 1784. Destined for his father's pursuit, he spent two years, from the year 1798, at the Caroline College in Brunswick, and removed, in 1800, to the University of Berlin, where he attended the lectures on jurisprudence, but at the same time visited the Architectural Academy. The study of the law harmonized little with the young man's inclination, which turned most decidedly towards architecture, and was supported by unmistakeable natural ability. Hofrath Hirt, and Oberbaurath Gilly, having their attention called to his labours, assisted him with advice and instruction, and encouraged his determined endeavours. His father, on the contrary, was decidedly opposed to his wishes, and used all his influence with his attached son, to prevent him following a path which promised no apparent happy result. But his opposition at length yielded to entreaty and representation—and the day on which the son obtained permission to lay aside the study of the law was a real *fête* day for the young artist. Three years after his arrival, he could at length live the desired artistic life, and forthwith resolved to see the world, commencing with France. But what he saw in that country could but little satisfy him, however much it assisted in expanding his artistic views, and in increasing his store of theoretic information.

Neither the buildings of the old German taste, nor those of the Renaissance, in their various periods of development, caused kindred strings to vibrate in the breast of the young artist, inclined with deeply fixed preference to Hellenic art. After a longer sojourn in France and its capital—which then signified the world—Klenze crossed the Channel, in order to prosecute his studies in England. But what has been said of France, applied with far greater force to England, and so the artist proceeded, with unweakened powers, to the renowned land of art and artists—Italy, whose beauties produced an inspiriting effect on his susceptible mind. A connexion extending, perhaps, back to the time of his first sojourn in Paris, was resumed after his return home; and the year 1808 found Klenze in his twenty-fourth year, Court Architect of Jerome, King of Westphalia, who, however little fitted for a ruler, yet possessed enough ordinary education to be able to recognize the worth of the young man. How high Klenze stood in the royal favour is shown by his advancement, in 1810, to the post of Director of Royal Buildings.

On the sudden fall of Jerome, Klenze, having no permanent appointment, resolved to go to Vienna, and passed through Munich on his way. Here his destiny was decided, by his having the good fortune to be presented to the then Crown Prince Lewis; through the interposition of which accomplished personage he was summoned to Munich, in 1814.

The foundation of his future renown was thus secured. Fischer, although not pursuing the same course as Klenze, but adopting Palladio's views of art, had entered energetically into the contest with the old "Pig-tail" style, and so prepared the way for Klenze's productions. The Crown Prince was the first to confide to Klenze the erection of a large monumental building, the Glyptothek (1816-1830) which, in the shape of a temple of plastic art, unites in its proportions seriousness and cheerfulness, dignity and grace.

In the year 1817 Klenze commenced the Leuchtenberg Palace, in which he was directed to follow the style of the Renaissance — and which, in general arrangement, recals to mind the Farnese Palace in Rome. Three years later the Royal Riding School was erected, in the style of the Roman Palaces, whose purpose is clearly announced by its external appearance. In 1822 Klenze built the Bazaar, adopting this time the Venetian style.

Meanwhile, the first works of restoration of the Cathedral of Spires, and of the Monuments of the Emperor Rudolph of Hapsburg, and Adolph of Nassau, were undertaken. In the War Office, commenced in 1824, and finished in six years, the architect introduced the Florentine style. The completion of the Pinakothek occupied the interval between 1826 and 1840—the last four years were given to the ceilings and wall paintings in the Loggie. Klenze, in this imposing building, followed generally the type of the Roman Palaces, but did not hold himself in any way fettered to a strict imitation, and ventured to reproduce their forms in a free and independant manner. In this building, material of various colours was first introduced in Munich, and, in fact, the alternation of the greenish free stone (of which all the architectural members, as cornices, columns, &c. consist) with the yellowish brick-work of the wall surfaces, left without any external coating of stucco, produces the happiest effect. In the same year, 1826, King Lewis laid the foundation stone of the Royal Palace (Königsbau), of the Court Chapel, dedicated to all Saints (Allerheiligen Hofcapelle), and of the Odeon—the execution of all three being entrusted to Klenze. For the Königsbau his attention was directed to the Palazzo Pitti, Florence, as a type; for the Allerheiligen Capelle, at least for the interior, to the Chapel of St. Rocco, Palermo, and the Church of St. Mark, Venice, while the Odeon was required to correspond, externally, with the Leuchtenberg Palace.

The Königsbau surpasses the Pitti Palace in internal comfort and cheerfulness, without yielding the palm for dignity and grandeur of proportions. In the facing of the plinth with regularly worked diamond blocks of stone, and in the treatment of the main entrance, and of the windows, the Munich building is far superior; the magnificent effect of the exterior is, moreover, surpassed by the tasteful dignity of the interior.

In the Allerheiligen Capelle recourse was had to the Romanesque round arch style of the Italian churches of the eleventh and twelfth centuries.

Although, in respect of convenience, much exception has been taken to the entrance, and to the internal arrangement of the Odeon, still the noble simplicity, and the excellent acoustic peculiarities of the large concert room doubly outweigh those objections.

The Palace of Duke Maximilian, finished in 1830, displays the Roman Renaissance style, and great dignity with much simplicity—as became the position of the proprietor. The interior is remarkable, as much for comfort as for refined splendour.

In 1832, the building containing the great Hall of the Royal residence, facing the Hofgarten, was commenced. It forms the completion of the whole pile towards the north and east, and is carried out in the style of the Roman Renaissance. The structure was ten years in hand. The front extends about nine hundred Bavarian feet, its main feature being the central portion, containing the entrance, which projects considerably from the rest, highly ornamented, like Palladio's Palaces, and has double arcades.

Hardly any modern building in the world can present a more important *façade*. In this building Klenze established, unmistakeably, his claim to inventive genius—as he had, for the most part, to retain existing buildings, and make them harmonize with the new work.

The year 1834 brought Klenze to the object of his most earnest wishes—Greece, whose newly founded monarchy had been entrusted to a Prince of the Bavarian dynasty. Klenze's occupation in that country was to test a plan for building the new city of Athens, and, where necessary, to modify it. At the same time he was directed to look to the security of the ancient buildings, especially the Acropolis—and it must be allowed that the charge could not have been committed to better hands. A plan for the Royal Palace, in Athens, was necessarily laid aside, for financial reasons.

The year 1835 saw the construction of the Monopteral Temple, in the Park at Munich, and the north front of the Post Office. In both buildings, Klenze introduced, for the first time, polychromy, which, however, did not meet with special approbation. His reputation had now extended far beyond the limits of Bavaria and Germany. The Winter Palace in St. Petersburgh, having been burnt down, he was summoned to that city by the Emperor Nicholas, who had seen his works in Munich, and entrusted by that autocrat with the erection of the new Palace, and of the great Church of St. Isaac.

Klenze's Ruhmeshalle (Hall of Fame), built 1843-1851, is one of his finest productions—it is, undoubtedly, the most noble, and is carried out with the utmost purity. The projecting wings of this imposing building, whose open hall is supported by eight-and-forty Doric columns, add considerably to the general effect. It is to be lamented that the immediate vicinity affords but little opportunity for comparing with others, the proportions of this superb building, in which the artist's pure Hellenic perception of the beautiful was freely developed, far beyond any other of his works.

It has been a subject of much observation, that Klenze chose Greek forms for the Wallhalla, which King Lewis had entrusted to him, instead of the German style, which was alleged to be more in consonance with the fundamental idea of the building—but, at the same time, it has been forgotten that the so-called Gothic style is not in the least nearer related to the old heathenish view of the subject. The controversy has, however, been long forgotten, and whoever passes either up or down the Danube, between Ratisbon and Straubing, sees, impressed with the grandeur of the Royal conception, the proud temple to German fame and German greatness.

The Wallhalla was not completed when the King resolved, in 1846, to complete the Königs Platz, in Munich, by an arch, whose ornamentation should represent the history of the restoration of Greece in the last twenty years. Basing his design on the use of a gate, as a means of defence, Klenze gave the building two towers, with a main entrance between, for which he chose the Doric order. The idea of defence is most unmistakeably conveyed by the platforms, with their defensive piers supporting the roofs of the towers.

Klenze's artistic activity found a conclusion worthy of his genius in the colossal Hall of Liberation, at Kelheim. After the death of Director Gärtner, in the year 1847, the continuation of the building was entrusted, by the King, to Klenze, who made such extensive alterations in the design, that the gigantic structure which now stands on the Michelsberg must be considered as exclusively his work. Carried out in noble and grand proportions, stamped with the mark of ideal beauty, it proclaims, not only the victory of the German people over their common foe, but also the genuine German sentiment of the Royal builder, and the renown of the architect so highly distinguished, beyond all others, by Royal favor.

As Klenze's life was one of activity, so was it one of success and renown. Highly valued by his sovereigns, he was indebted to them for many marks of distinction. King Lewis appointed him, in 1826, Chief Building Councellor; 1830, Chief of the Office of Works and Buildings; 1831, Special

Privy Councellor, Royal Chamberlain, and Superintendant of Royal Buildings, and placed him, in 1833, with his legitimate successors, among the nobility of the kingdom. Among the nineteen orders which had been conferred on him were:—the Bavarian Maximilian Order for Science and Art; the Commander's Order of Merit of the Bavarian Crown; the Grand Cross of the Hanoverian Guelphic Order; the Portuguese Order of Christ; several Russian, Prussian, &c.

By his marriage with Felicitas von Blangini, who died 9th of November, 1844, he had two sons and two daughters; of these only the elder son, a Colonel in the Bavarian army, and the younger daughter, married to Count Max von Otting, survive.

The above necrology, published in a Munich Newspaper of February 1st, 1864, was forwarded by Colonel von Klenze, in compliance with a request made to him by the Honorary Secretary for Foreign Correspondence of this Institute. In a letter accompanying it, Colonel von Klenze states that the paper is official, and that the notice is the best that has appeared, but that two omissions in it require rectification.

First. Klenze, on his arrival at Munich, could not find a good mason, carver, painter or carpenter, and that he had to instruct the fore-fathers of the numerous Landiem men now in that capital.

Second. He never exceeded the sum originally fixed as the cost of constructing his works, though some of them were twenty years in hand. Indeed, in some instances, as in the Propylæum, and in the Liberation Hall, at Kelheim, the actual cost was very considerably less than the estimates.

The Chevalier von Klenze was among the earliest Foreign Members (1835) of the Royal Institute of Architects; with the objects of which, previously to his election, he expressed himself highly satisfied to the present Honorary Secretary for Foreign Correspondence, who was then in Munich. He was the second Foreign architect to whom the Royal Gold Medal of this Institute was awarded—1852.

Illustrations of most of his public works, presented by himself, or contained in the various Annual volumes of the Allgemeine Bauzeitung, will be found in the Library of this Institute.

Many private buildings, not mentioned in the above notice, were designed by him and executed under his directions.

COPY OF DEED OF TRUST
FOR
THE PUGIN TRAVELLING STUDENTSHIP.

Dated 7th March, 1864.

To all to whom these Presents shall come THE INSTITUTE OF BRITISH ARCHITECTS sends greeting

WHEREAS it was some time since resolved by a number of persons interested in British Art to do honour to the memory of Augustus Northmore Welby Pugin deceased in respect of the services rendered by him during his lifetime in ascertaining and developing the principles of British Mediæval Architecture AND WHEREAS in furtherance of such object it was resolved by the persons aforesaid that a fund should be formed for the purpose of providing a permanent endowment for a Travelling Studentship to encourage the study of Mediæval Architecture of Great Britain and Ireland AND WHEREAS pursuant to the said resolutions divers sums of money were subscribed by the persons aforesaid with a view to the investment thereof and the application of the dividends and interest arising therefrom in support of such a Studentship as aforesaid AND WHEREAS the net amount of such monies &c. as aforesaid after deducting all expenses attending the said subscription and the execution of these presents is Nine hundred and sixty-nine pounds eleven shillings and sixpence AND WHEREAS by Letters Patent under the Privy Seal of the United Kingdom of Great Britain and Ireland bearing date on or about the Eleventh day of January One thousand eight hundred and thirty-seven after reciting that Thomas Philip Earl de Grey had by his petition represented unto his late Majesty King William the Fourth that he and other persons had associated together for the purpose of forming an Institution for the general advancement of Civil Architecture and for promoting and facilitating the acquirement of the knowledge of the various Arts and Sciences connected therewith It was made known that His said Majesty did grant and declare that the said Thomas Philip Earl de Grey and such others as had formed themselves into and were then members of the said Society or who should at any time thereafter become members thereof according to such regulations or bye-laws as should be thereafter framed or enacted should by virtue of the reciting Charter form one body corporate for the purposes aforesaid by the name of "The Institute of British Architects" by which name they should have perpetual succession and a common seal And further that there should be General Meetings of the Members of the said Body Corporate to be held from time to time as thereinafter mentioned And that there should always be a Council to direct and manage the affairs of the said Body Corporate And that the General Meetings and the Council should have the entire direction and management of the same in the manner and subject to the regulations thereinafter mentioned and that the Council should consist of the Members therein specified And that the General Meetings should make and establish such Bye-laws as they should deem to be useful and necessary for the regulation of the said Body for the management of the estate goods and business thereof and should or might from time to time alter vary or revoke such Bye-laws and make such new and other Bye-laws as they should think most useful and expedient so that the same was not repugnant to the reciting Charter And that the Council should (subject to the powers vested in the General Meetings) have the sole management of the income and funds of the said Body Corporate and also the entire management and superintendence of all the other affairs and concerns thereof And that the whole property of the said Body Corporate should be vested in the first class of Members thereof called Fellows AND WHEREAS pursuant to the said Charter of Incorporation certain Bye-laws of the said Institute of British Architects were made and established at a General Meeting of the Members holden on the seventeenth day of January One thousand eight hundred and fifty-three and by such Bye-laws it was provided that the Council of the Institute should besides a President three Vice-Presidents and two Secretaries consist of ten other Members of the class of Fellows and that the Council should have the management and direction of all the affairs of the Institute and that all questions should be decided in the Council by vote unless a ballot be demanded and in the case of equality the person presiding should have a second or casting vote and the determination of the Council whether by vote or ballot should at the desire of any three Members present be deferred to the succeeding meeting And that the Council should present a report on the state of the property and affairs of the Institute to the Annual General Meeting And that the Council should have power to make such regulations for carrying into effect the Charter and the Bye-laws and for the general management of the affairs of the Institute as circumstances should in their opinion render from time to time necessary such regulations to be reported to the next Ordinary General Meeting and to be subject to repeal or alteration by a Special General Meeting of the Members of the Institute And that the whole of the effects and property of the Institute should be under the control and management of the Council subject to the instructions of the General Meeting And that the Common Seal should not be affixed to any deed or writing except at a Meeting of the Council and by their authority and such deed or writing should then be signed by the President Vice-President or the Fellow in the chair and by two of the Fellows present and by one of the Secretaries with an exception as to certain certificates therein mentioned AND WHEREAS pursuant to an arrangement in this behalf which has been made between the Committee of Subscribers to the said Endowment on the one hand and the said Institute on the other hand the said sum of Nine hundred and sixty-nine pounds eleven shillings and sixpence has been invested in the purchase of Eight hundred and forty pounds Perpetual Five per Cent. Preference Stock in the London and North Western Railway in the name of the said Institute in order that the trusts of the said Endowment may be administered by the said Institute AND WHEREAS it was stipulated on the part of the Subscribers of the said monies when the said sum of Nine hundred and sixty-nine pounds eleven shillings and sixpence was so invested as aforesaid that the first Student who should take the benefit of the said Studentship should be elected by a Committee of nine persons composed as mentioned in the Schedule hereunder written AND WHEREAS with a view of stamping the said Endowment with a permanent character corresponding with the object for which the said monies were subscribed it was also stipulated on the part of the said Subscribers when the said sum of Nine hundred and sixty-nine pounds eleven shillings and sixpence was so invested as aforesaid that the purpose of the said Studentship should be clearly and unalterably defined to be the promotion of the Study of the Mediæval Architecture of Great Britain and Ireland and that a declaration of trust should be made and executed in manner hereinafter mentioned and contained and that the regulations hereinafter mentioned should be incorporated herewith and remain unaltered in any respect calculated to interfere with the application of the dividends and interest arising from the said sum of Eight hundred and forty pounds Preference Stock in supporting a Travelling Studentship by way of inducement to the last-mentioned study NOW THEREFORE KNOW YE AND THESE PRESENTS WITNESS that it is hereby declared by and on the part of the said Institute in manner following that it is to say That the said sum of Eight hundred and forty pounds Preference Stock so invested in the name of the said Institute as aforesaid shall be retained in such investments or shall be invested upon Government or real security in Great Britain or on Mortgage of Leasehold Estates in Great Britain of which there shall be an unexpired term of not less than Sixty years or in the purchase of Stock Shares or Debentures of any Railway Company incorporated by Act of Parliament and upon which Stock

Shares or Debentures an actual dividend shall have been paid or in any Loan or in the purchase of any Stock made or created for the purpose of the East Indian or any Anglo-Colonial Government and such securities may from time to time be changed for others of a like character as occasion shall arise or as shall be deemed expedient by the Council of the said Institute AND FURTHER that the interest dividends and annual proceeds of the said sum of Eight hundred and forty pounds Preference Stock or other the Stock Funds and Securities whereon the same may be invested shall from time to time be applied by the Council of the said Institute in support of a Travelling Studentship for promoting the study of the Mediæval Architecture of Great Britain and Ireland AND FURTHER that the said interest dividends and annual proceeds should be applied in manner aforesaid in accordance with the regulations set forth in the Schedule hereunder written IN WITNESS thereof the Common Seal of the said Institute has been hereunto affixed in the presence of and these presents have been signed by the President [or Vice-President] of the said Institute and two of the Fellows and one of the Secretaries thereof this Seventh day of March in the year of Our Lord One thousand eight hundred and sixty-four

THE SCHEDULE HEREINBEFORE REFERRED TO.

REGULATIONS FOR THE ADMINISTRATION OF THE FUNDS OF THE PUGIN TRAVELLING STUDENTSHIP.

I.

THE Endowment shall be called "The Pugin Travelling Studentship."

II.

On the first Monday in February, in the year One thousand eight hundred and sixty-five, and the first Monday in February in every subsequent year, or as soon thereafter as conveniently may be, there shall be elected "A Pugin Travelling Student," who shall be qualified as after mentioned.

III.

In the year One thousand eight hundred and sixty-five the election shall be made by a Committee of nine persons, or the majority of them. Such Committee shall consist of Alexander James Beresford Beresford Hope, George Gilbert Scott, Joseph Clarke, and Thomas Talbot Bury, Esquires, or such of them as shall be living, and of so many other persons as shall make up the number of nine. Such last mentioned persons shall be nominated by the Council of the Institute of British Architects out of its Fellows. In the year One thousand eight hundred and sixty-six, and in every subsequent year, the election shall be made by the Council of the Institute of British Architects.

IV.

Every person of whatever Nation shall be eligible as Student, who shall be more than eighteen and less than twenty-five years of age, provided that he give to the Electors satisfactory evidence of his moral character, and satisfy them that he is a Student of Architecture, *bonâ fide* intending to practise the profession of an architect, and that he exhibit specimens of his drawings, and state the district of the country which he proposes to visit, and the class of buildings which he intends to study.

V.

No person who has once held the Studentship shall be eligible for re-election.

VI.

If several Candidates shall offer themselves in any year, the Electors shall make their selection by comparison of their applications, drawings, and testimonials, and not by way of any competitive examination. The Student shall immediately on his election sign an undertaking to make a tour in some part of the United Kingdom of not less than eight weeks' duration, and to devote such tour to the study of the Mediæval Architecture of Great Britain and Ireland, including buildings designed on mediæval principles down to the period of the Great Rebellion. The Student shall also indicate in a general way the buildings he intends to visit, but shall not be absolutely bound by such indication.

VII.

Every Student shall, on or before the first of January following his election, deliver to the Institute of British Architects a paper descriptive of his tour, and illustrated by sketches and measured drawings. Such paper and sketches shall be the property of the Institute, and shall be preserved by them separate from their other collections, and shall be open to inspection of all members of the Institute during the hours when the Library is open. The measured drawings shall remain in the custody of the Institute for six calendar months from the said first of January, and shall during that period be open to inspection as aforesaid. They shall then be returned to the Student.

VIII.

It shall be lawful for the Institute at any time within six calendar months from the said first of January to take copies of the said measured drawings for their own use; and also at any time within twelve calendar months from the said first of January, to publish, at their own cost, and for their own benefit, the said paper, or any part of it illustrated by the said sketches and measured drawings, or a selection of them. If they publish the whole paper, sketches, and measured drawings, the copyright shall be theirs absolutely. If they do not do so, the copyright shall, from the expiration of such twelve months, be the absolute property of the Student.

IX.

If the Council of the Institute are satisfied that the Student has performed his undertaking, and has to the best of his ability complied with the provisions of Rule VII. they shall pay to him the whole of the net income of the fund for the year immediately preceding his election. If the Student has failed wholly or in part to perform his undertaking, or to comply with the provisions of Rule VII. the Council may, if they are satisfied that such failure has not been wilful, pay to him, or his representatives, the whole or any part of the said net income.

X.

A separate Tablet, or separate Tablets, recording the names of the Students shall be set up, and for ever preserved in a conspicuous part of the premises of the Royal Institute of British Architects.

XI.

If in any year no candidate shall offer himself, whom the Electors shall think worthy, or if from any cause the income or any part thereof shall be unapplied in manner provided by the Rules in that behalf, such unapplied income shall be applied either in increasing the value of the Studentship for that or any subsequent year or years, or in providing one or more additional Studentships, of like nature to that above described, for that or any subsequent year, or in both such objects, at the discretion of the Council of the Institute.

(Signed)
THOS. L. DONALDSON, *President.*
OWEN JONES, *Vice-President.*
BENJAMIN FERREY, } *Fellows.*
T. HAYTER LEWIS, }

(Signed)
JOHN P. SEDDON, } *Honorary*
CHAS. FORSTER HAYWARD, } *Secretaries.*

ANNOUNCEMENTS AND OCCASIONAL PAPERS.

REMARKS of the PRESIDENT, T. L. DONALDSON, on the Presentation of the Royal Gold Medal to M. VIOLLET LE DUC, April 18th, 1864.

I cannot forbear (said the PRESIDENT) alluding to the class of study to which Mons. Le Duc has devoted so much of his time, his talents, and his researches. Mons. V. le Duc did not embarrass himself with the question, here sometimes put, whether Mediævalism has done its work and spent its force, and having exhausted itself in the sixteenth century, can be revived with vitality sufficient to resume that influence over the men of the nineteenth century, that it exercised over them from the tenth to the fifteenth. He assumed that it could, and set himself to work to prove it. It is a noble function, that he has assumed to himself, no less than to penetrate the hidden mysteries of the Mediæval ages of art—to seize and explain the inspirations, which gave rise to the noble productions of the Gothic times—to seize their peculiar features—and by pen and pencil to give a definite meaning to that, which hitherto seemed obscure. In one branch he has been eminently successful, in illustrating the varied appliances, skill and resources, by which the fortifications of cities became of vital importance to the safety of the citizens. For then the barons not only exercised kingly power within their own domains, but waged war with their neighbouring chiefs, nay, too often with their sovereign himself; and thus the countries throughout Europe,—France, Great Britain, Germany, Italy, as elsewhere, teemed with castles, forts, strongholds, and fastnesses. How many of them do we not see dismantled, overthrown, and in ruins, and forming some of the most picturesque objects in the natural landscape, and adding all the associations of historic events to the wild savage scenery of the rocks and mountains and passes, or the graceful beauties of the valleys, or the prominences of European rivers, as the Seine, the Moselle, and the Rhine. How many olden city walls do we behold crumbling away or being destroyed to make way for railway termini, or to open accesses to the towns, as at York, or gradually being enveloped in the dwellings of the citizens, often too happy to find a home in the towers and gateways. This fruitful subject Mons. V. le Duc has followed up with painstaking research. He has shewn in the restoration of Carcasonne the enormous dimensions in the height and breadth of the city wall encircling it, as with an impenetrable zone of Titanic strength, and the skill, labour, and industry bestowed on these works. He has shewn the towers, rising story above story, and floor above floor, filled with its busy warriors, and all the muniments of defence. Strange to say, he has explained how the projecting corbels of stone, as still found in the city walls of Newcastle and hitherto not understood, supported galleries and stages of wood, which, otherwise, one would have thought a material of all others least fitting for resistance to attacks, yet which was not so regarded by those warriors. He has analyzed the machines of offence and defence, described their various weapons, and all with a science, taste and erudition, which entitle him to be regarded as the most complete, correct and intelligent expositor of the science of war between the tenth and fifteenth centuries of our æra. It is a noble task in any one to take up any special subject of importance connected with his professional pursuits, and to devote himself with passion to its investigation, to illustrate its principles, and to bring to light the hidden laws by which it is governed. He, who does so, confers a benefit on those of his own period, and of every successive one. He may clear away the obscurities which hide from view a great truth, and open up a prospect leading to the discovery of others. Such were the men, who, in times past, promulgated the first laws and principles of astronomy, medicine, mechanics, and so prepared the way for the present advanced state of science. And thus may we regard the researches of M. le Duc as associated with such, in clearing away the mists, that have hitherto prevented us from appreciating in all their fulness the works of the middle ages. Next to the power of creating great works, and embodying in buildings themselves the teeming riches of an inspired fancy, is the power of appreciating such productions, and Mons. le Duc has in the Sainte Chapelle and Notre Dame, at Paris, shown his skill in the restoration of noble monuments of Mediæval taste. Let us feel assured, that it is reserved for him to embody in like erections of original thought, and to endow his country with entire and new monuments of his refined taste and skill, original emanations of his own genius and the fruit of his severe studies, fulfilling the promise of such a work as his "Dictionnaire de l'Architecture." When he has this medal in his possession, it will serve to remind him, that he has here friends and admirers, who will take a deep interest in his success, and look for, and eagerly acquaint themselves with, whatever new subjects his pencil or his pen may produce—the fruits of his imagination and results of his unremitting labors.

Royal Institute of British Architects.

VOLUNTARY ARCHITECTURAL EXAMINATION, 1864.

ALPHABETICAL LIST OF CANDIDATES WHO HAVE PASSED (THIS YEAR) IN THE CLASS OF "PROFICIENCY."

AUSTIN, HUBERT JAMES	5, Collingwood Terrace, Gateshead.
BAYNE, RICHARD ROSKELL	13½, Great Smith Street, Westminster.
GOUGH, WILLIAM VENN	2, Exeter Buildings, Redland, Bristol.
HADFIELD, CHARLES (*Associate of the Institute*) .	Knowle House, East Bank Road, Sheffield.
JAMES, ROBERT CULVER (*Temp. Student of Institute*)	32, Newington Place, Kennington, S.
JOWERS, ALFRED	15, St. George's Road, Kilburn.
LINKLATER, MORTIMER H.	Belfast, Ireland.

LIST OF CANDIDATES WHO HAVE PASSED (THIS YEAR) IN THE CLASS OF "DISTINCTION."

SPIERS, RICHARD PHÉNÈ (*Associate of the Institute*)	Oxford.
BAYNE, RICHARD ROSKELL	13½, Great Smith Street, Westminster.

M. Digby Wyatt, Fellow, Examiner last year, was unable to undertake the duties on this occasion, owing to the fact that these two gentlemen and Mr. Jowers, were in his Office at the time of becoming Candidates for the Examination.

EXAMINERS:—ARTHUR ASHPITEL, F.S.A., Vice-President.
GEORGE GILBERT SCOTT, R.A., Fellow.
T. HAYTER LEWIS, F.S.A., Fellow.

MODERATORS:—J. W. PAPWORTH, Fellow.
C. FOWLER, JUN. Fellow.

(Signed) J. P. SEDDON, } Hon. Secs.
C. F. HAYWARD. }

REPORT OF THE HONORARY SECRETARIES TO THE COUNCIL.

February 15*th*, 1864.

GENTLEMEN,

We have now the pleasure of reporting to you the result of the Second Voluntary Architectural Examination in the class of *Proficiency*, and the first in the class of *Distinction*.

The number of Candidates applying for admission to the Examiners was:—

In the class of Proficiency . . . Eighteen
In the class of Distinction . . . Two

being one less than last year in the former class; and one gentleman being a candidate in both classes is, of course, reckoned separately in both.

In the class of Proficiency it was found necessary in looking over the preliminary work to reject only three candidates, as not having sufficiently complied with the necessary regulations—thus leaving *fifteen* on the list of candidates admitted to the Examination—being one more than on the former occasion.

In the class of Distinction both candidates fully complied with the regulations as to preliminary work.

On the days of Examination these gentlemen duly presented themselves, and as will be seen by the reports of the Examiners and Moderators—which we herewith lay before you—acquitted themselves so well that both the character of the work done, and the conduct of the candidates themselves during the Examination, are the theme of commendation in both reports, and may be considered a source of congratulation to the Institute.

The final result is found to be that in the class of PROFICIENCY—*seven* candidates have obtained sufficient number of marks to pass—and that *eight* have failed to do so.

The names of the successful candidates are appended to this Report.

We may remark with regard to the above that the general standard of the Examination has been somewhat raised this year, owing to the allowance of marks permitted by the Council in the first year having been reduced one half. So that the number of marks necessary to be obtained was 2750, instead of 2500 as last year. Next year, however, the full standard of 3000 marks will be required. It is gratifying to know, however, that only one candidate who has passed required this allowance to make up his number, and that of the rest—the lowest obtained 55, and the highest as many as 1840—above the regular standard of 3000 marks; though this is after all not quite so favorable as last year.

One of the candidates who have passed, was allowed by a special resolution of Council (founded on the report of the Examiners last year) to attend only the third day of this year's Examination. One of the successful candidates is an Associate of this Institute, and one a Temporary Student; but it is remarkable that out of the whole number, *four* are from the Provinces and only *three* from London.

An analysis appended to this will show more clearly the peculiarities of the Examination, but we may further observe that several cases occur, as in the last Examination, where candidates obtaining many more marks altogether than necessary to pass* yet failed in one important branch, and so were unable to pass. This, in one or two instances, seems particularly unfortunate, but proves satisfactorily the great importance of the regulation.

In the class of DISTINCTION—*both* candidates have succeeded in passing with numbers of marks well over the necessary quantity. Their names are appended to this, and one of them will be well known as an Associate and a Prizeman of this Institute, as well as a Medallist of the Royal Academy. The other gentleman has the distinction of being the first to go through the entire Examinations (for Proficiency and Distinction) at once, and in the six days to obtain more than two thousand marks above the next year's full standard quantity required to pass both examinations.

In conclusion, we request your instructions to call together the Voluntary Architectural Committee, in order to consider and enable us to carry out the various suggestions of the Examiners and Moderators, if they should be deemed practicable, and to authorize us to issue a fresh edition of the Regulations, &c. of the Examination.

We are, Gentlemen,

Yours faithfully,

JOHN P. SEDDON,
CHAS. FORSTER HAYWARD, } Hon. Secs.

---

* One to the extent of 615, and another to the extent of 245, beyond the full standard of 3000 marks.

REPORT OF THE EXAMINERS,

(Presented to the Council, February 15th, 1864, and read at the Ordinary General Meeting the same evening.)

9, *Conduit Street, February* 13, 1864.

To the Honorary Secretaries of the
Royal Institute of British Architects.

Gentlemen,

Having carefully gone through the various papers and drawings exhibited to us by the Moderators, we now hand to you the number of marks which we consider due to the various candidates on each subject of each day. But as the only designation on every paper is a private mark of the Moderators, which is varied every day and wholly unknown to us, the results can only be made known when you have gone through our figures and have allotted them according to the said private marks furnished to you by the Moderators.

We fear that at first sight the papers of questions may appear too long and too heavy. This has arisen from the circumstance that the several candidates had selected very many (almost every one) of the subjects set down in the Regulations of the Institute, pp. 3 and 4. It was therefore necessary to take the widest range possible into our consideration, and to set papers on all. But we took especial care to impress upon the candidates our wish that they should pay attention more to the correctness of the answers than to the number of them; and it is hoped that the questions have drawn forth from each candidate the result of his studies, and elicited examples of the knowledge which he has been enabled to store up.

It is, however, our duty to call to your notice the fact that the time is certainly not enough for the work that ought to be performed by each candidate. We have made every allowance for this circumstance, but should strongly recommend that in future a greater number of days be allowed to each class, in order that the various subjects—more particularly those of drawing and design—may be more fully and completely worked out. The Moderators, who day by day observed the pressure on the various candidates, will probably suggest the extension of time they think desirable.

One most important circumstance we would also venture to impress on the Council, viz., that the time allotted for the Examiners to get ready the various questions has been far too short. This year there has been a double set of papers to prepare, the second set of much greater difficulty than the first, and to do this we had barely three weeks. Engaged as we all are in the active exercise of our profession, it is no exaggeration to say our work this year has been very pressing, and has not been carried through without a considerable sacrifice of valuable time. We see no reason why future Examiners could not as well be nominated early in December as in January, and would strongly urge on the Council that arrangements to effect this should be carried out. We would also suggest that fourteen days be allowed for preparing the Report, instead of seven as at present.

Taking the system as a whole, we see no need of alteration except in a few minor matters. We think that it would be desirable to empower the Examiners to separate the marks for drawing and design from those for geometrical drawing, which at present are thrown together. We think also that it should be more clearly made known that the latter branch should be treated practically as a question of drawing, and not worked out by calculations as have been done in several instances.

We also think that the number of marks allotted to the class of distinction should be much greater; at present they are but two-thirds of those of proficiency, which is apparently an anomaly. The smallness of the numbers, too, rather fetters the Examiners in allotting the marks to so wide a range of subjects as that embraced in the Class of Distinction. We beg also to suggest that the candidates in this class should be required to obtain a certain number of marks in each subject, like those in the Class of Proficiency.

We also beg to remark that in the Class of Distinction neither candidate has taken any notice of the papers set in Greek and Latin, and only one of those in French. We had understood that satisfactory answers to one of the classic papers were necessary for passing in this class. But the rules are not very clear on the subject, and we beg therefore to bring this circumstance to your notice, that you may lay it before the Council for their determination.

We must now sincerely congratulate the Institute on the progress and success of the Examination. Although the standard has been fully maintained, and in fact a greater number of marks have been required to be obtained this year, in order that a candidate may pass, than was required last year (a circumstance which has arisen in consequence of the Council allowance being but half what it was before), yet much of the work produced has been decidedly of a higher order. The best of the designs this year have clearly been superior to those of the past, and in the branch of History and Literature, instead of a short *resumé* of a subject, each candidate has produced a regular essay or thesis. So complete and so well written are some of them, that we would venture to recommend that one or more be printed, that it may be shewn to the profession how much can be done in two hours' time, if the candidates will but earnestly apply themselves to their work. We also would recommend the exhibition of a selection of the drawings, and for the same purpose.

We think, also, that it would be a saving of time and trouble to all parties, if the recommendation made by the Moderators each year be adopted with respect to issuing blank forms of the requirements to be filled up by the candidate.

There is but one thing more that we would suggest, viz,, that it would be a very desirable thing if the Institute would arrange for a Series of Lectures to be given, practically bearing on all the points of the Examination.

We have the honor to be, Gentlemen,

Very faithfully yours,

Arthur Ashpitel, F.S.A., V.P.
Geo. Gilbert Scott, R.A.
T. Hayter Lewis, F.S.A.

REPORT OF THE MODERATORS,

(Presented to the Council, February 15th, 1864, and read at the Ordinary General Meeting the same evening.)

9, *Conduit Street, Hanover Square, W., February* 13, 1864.

To the Honorary Secretaries of the
Royal Institute of British Architects.

Dear Sirs,

We beg to hand you herewith a list of the signs affixed by us to the papers and drawings prepared by the candidates in our presence, in order that, by a comparison of those signs with the number of marks allowed by the Examiners to the several papers and drawings, you may ascertain the total number of marks which each candidate has obtained.

In doing this we have, we believe, completed our duties; but we venture to think that some notes of our experience gained on this occasion may not be without value as to the course of future Examinations.

We have endeavoured, as was our duty, to conduct the Examination strictly in accordance with the rules laid down by the Institute. We have ventured however, in one instance, to make a slight technical modification, which we considered to be required by the circumstances.

According to the plan adopted last year, which appears also to be contemplated, though not actually expressed, by the rules for the conduct of the Examination, the whole of the subjects in the Class of Proficiency are divided between the six half-days allotted to that Examination; this appears in some cases to be undesirable. For instance, three hours seems an insufficient time for the subject of "Drawing and Design," given for the morning of the first day, whereas "Geometrical Drawing," the subject for the afternoon of the same day, might well be disposed of in a much shorter time. Acting on this impression, we therefore permitted the candidates to continue the work of the morning during a portion of the afternoon, the papers not being collected till the end of the day.

Having ventured to make this modification in the present instance on our own responsibility, we are induced to direct your attention to the question, whether it would not be desirable to devote rather more time in the Examination to the subjects of drawing and design?

As this has been the first Examination in the Class of Distinction, our experience leads us to direct your particular attention to the short time allowed for this course. It appears somewhat anomalous that for this more severe Examination less time should be allowed than for that in the Class of Proficiency; this appears more especially the case for the subjects of drawing and design.

As to the general arrangements for this Examination, it will be sufficient to say that they were the same as last year; and we have much pleasure in being able to report that they were satisfactorily carried out, and that the attendance and conduct of the candidates were perfectly regular and orderly.

After the close of the first day's work, the Examiners met and inspected the drawings: and we can bear testimony to the great care and patient deliberation with which, during five hours, they pursued their investigations, and continued them further for several hours at the close of the course on the last day. We considered it our duty to attend the Examiners on these occasions, to render them any assistance in our power.

At the close of each of the other days the papers of answers collected from the candidates were sealed up and sent to the Examiners, after having been marked with distinctive signs known only to ourselves, according to the system laid down in the rules for our guidance.

In conclusion, we think we may congratulate the Institute on the successful issue of the Second Course of the Voluntary Architectural Examination; and we trust the time may not be far distant when every young architect will consider it a privilege to avail himself of so valuable a test of the success of his studies.

We have the honor to be, dear Sirs,
Your obedient Servants,
Moderators, { CHARLES FOWLER, JUN.
JOHN W. PAPWORTH.

Mr. T. HAYTER LEWIS, Fellow (one of the Examiners), was very sorry that Mr. Ashpitel, unfortunately from being unwell, and Mr. Scott, through being out of town, had been prevented from attending this evening, for he was quite sure that both gentlemen very much regretted that they could not be present. It could scarcely have been possible to have exceeded the interest they felt in the success of the Examination and the attention they had given both to the setting the questions and to the Examinations themselves; and he felt that if those Examinations were to be carried out to the satisfaction of all parties, it could only be done by having for Examiners gentlemen who would bring to bear upon them such zeal and energy in the cause as had Mr. Ashpitel and Mr. Scott. The Examiners had expressed, in their report, their views upon these Examinations, and they had been further dwelt upon in the report of the Moderators. It was therefore scarcely necessary for him to dwell very long upon the subject. There were one or two points, however, which he should be glad to bring somewhat more prominently before the meeting. The great thing in these Examinations was, unquestionably, that the candidates should be thoroughly satisfied with regard to the questions—that there should be nothing they should call "catch" questions—nothing which it might not fairly be expected that the men should be clearly able to understand when the questions were put before them; and that the papers should bring out from the several candidates a fair average amount of knowledge on different subjects—that there should be nothing which any candidate whose mind had been directed to the necessary course of study should not be expected fairly to answer. In order to do that, the Examiners met at once with a serious difficulty. Take the case of Natural Philosophy, for instance: one gentleman wished to be examined throughout the whole course, and this heading, according to the printed regulations, comprised altogether twelve different subjects. Therefore if they had an elaborate series of papers, and asked only four or five questions on each subject, this would give forty or fifty questions, which was enough to frighten away any young student. But there was, on the other side, this further difficulty, viz., that if a sufficient number of questions were not set, the candidate might possibly have reason to complain that the very subject upon which he knew most had been to some extent neglected, and that his chance of success had been therefore by so much diminished. It was thought better, therefore, to give general questions, making them as few as the subjects would allow, but at the same time treating each subject fairly. Another thing struck his fellow-Examiners more than it did himself—and for this simple reason, that it was his first year as an Examiner, whereas it was their second—viz., the superior quality of the work done this year in comparison with that of last year. Through the great care and attention of the Moderators, the Examiners were enabled to compare the drawings made during the two years very well indeed. They had this year's drawings put in a long series from one end of the room to the other, having them arranged according to their degrees of merit, and opposite to them the Moderators kindly arranged the last year's drawings in a similar way. There could be no question that the higher drawings of this year were superior to the higher drawings of the preceding year. Of course, he could not say that the improvement extended the whole way. There would always be a certain number of young men who would come up for examination a little sooner than perhaps they ought to do, and some good draughtsmen might get a little nervous, and not do, perhaps, at a first attempt what they might be able to do at a second; and therefore they would always find, perhaps, that the lower part of the scale was pretty much the same. But the highest class—and indeed the average of the whole—was decidedly better this year than last; and his fellow-Examiners said the same thing applied all through the several papers of questions. He would mention one thing which it was necessary the candidates should know, and that was the extreme care with which the printed regulations made it secure that the Examination should be fairly conducted. Until the names of the successful candidates had been read this evening, he had not the remotest idea as to who had passed. The Examiners knew that A. so-and-so had so many marks on the first day, but then A. signified a different person on the second or third day. B. or C. might be first on the second day, and A. might be last on the third day, the actual application of the several marks being known to the Moderators only, so that really, until the Honorary Secretary announced the names, they had not the most distant notion of who had passed. As far as he was concerned, he confessed he was altogether surprised at the quality of the work, considering the time in which it was performed. He believed that the time allotted to the paper on Architectural Literature was two hours only, and really some of the papers were wonderfully good. In looking through them, he remarked that the candidates must have capital memories and clear heads to be able to give the dates and the various details of the buildings, and other particulars, so accurately as many had done. Many gave elaborate treatises on various subjects, and these were not slovenly, but exceedingly well done—so well that they (the Examiners) hoped the Meeting would allow a selection of them to be published, to show what could be done in a couple of hours. Then, with respect to the lectures suggested, when they expressed their views upon this subject, they were rather afraid of making their Report too long; but it was their opinion that if this suggestion were adopted, it would be a great satisfaction and advantage to the candidates generally, especially to those who had failed. It was suggested that these lectures would to a certain extent take as a text the questions which were put, and then having them worked up and elaborated, as it were, by men who thoroughly understood them, it would better enable those who had failed to understand exactly why they had failed, and what they ought to do in order to read up for future examination. He hoped these lectures would be agreed to by the Institute. It would, he considered, be an excellent thing to have them, and from what he heard, he believed they would be heartily welcomed.

He should quite fail in his duty on behalf of his fellow-Examiners and himself, if he did not express to the meeting the very great obligation they owed to the Moderators for the care and attention they showed throughout, and also for the great assistance they were to the Examiners in the discharge of their duties. It was the first time of his being an Examiner, and he did not know how he should have got through the work, if it had not been for the kindness of the Moderators.

And now to conclude, he wished most earnestly to express his hope that the candidates who had failed this time, and those who had not had the courage to come forward, would not feel disheartened. He had watched these things from the first, and he had the strongest hopes that these Examinations, if carried out thoroughly, would prove of the greatest service in raising the tone of the profession; and the only thing that would tend to prevent that would be from the young men being discouraged. He sincerely hoped that would not be the case. In the great struggle of life, few men could hope to push their way at once, and be successful at the first attempt. Fail you may at the outset; but if you only persevere to find where you first were wrong and determine to set that right, it will only be by some unlucky chance if you do not succeed at the second time. Let any young man who had failed, think over the questions, and he would surely find for himself pretty well *where* he had failed. He must have said at the time to himself, "I understand that question, or I do not;" and if he had failed in passing the Examination as a whole, he would be pretty sure to be able to put his hand upon that particular paper of subjects in which his failure really had occurred; and if he would only just set to work and say, "I have failed in that, and will read up for it by the next time," there was no question that he would pass. He had a fair reason for urging the unsuccessful candidates to try again. This was not a competitive examination, where one candidate may say of the others, "They have more opportunity for study than I have; other men, stronger in health and more powerful in intellect than I am, will throw me on one side and distance me in the race, and my chance is not worth the trying for." But here it is not so. Let a man read, and understand what he reads, up to a certain point, and he was sure to pass, no matter how clever and how powerful his rivals. Therefore he urged them all not to be discouraged; and he repeated that if the gentlemen who came up this time and failed, and the twenty or thirty others who, though training, did not come up at all, would carefully consider where they failed or were likely to have failed, and work accordingly, determined to succeed, their future success was certain. He believed it would very soon be regarded as a great honour to pass these Examinations, and if so, the young men who had not passed them would be considered certainly behind the mark. Therefore he hoped that next time, instead of the eighteen candidates, there would be a much greater number, and that amongst them would be all, or nearly so, of those who had failed to pass this time. The whole subject had the very best wishes of the Examiners, and he was quite sure that neither of them regretted, in the slightest degree, the time and consideration which it had cost them.

The CHAIRMAN (Mr. Owen Jones, V.P.) said, it must be a source of great gratification to them all to have heard the reports of the Examiners and Moderators, together with the observations which had fallen from Mr. Lewis. The advice which Mr. Lewis had given to the young men in the profession he certainly hoped would be followed, and that next year they might have a continuation of that progress which he had pointed out. They had a duty to perform towards the Examiners and Moderators, who had devoted an extraordinary amount of time, to the sacrifice of their own professional engagements, towards these Examinations; and it behoved those who had been idle in the cause to award them their most sincere and hearty thanks for what they had done in carrying forward this important movement, which they all cordially approved. The Chairman then proposed, "that the best thanks of the Meeting be given to the Examiners and Moderators for the care, time, and attention which they had given to the subject," which was carried by acclamation.

PROFESSOR KERR, Fellow, thought that some such recognition should be taken of these reports, as that the meeting should congratulate the gentlemen who had passed upon the distinction they had attained, and also express its entire approval and satisfaction at the manner in which the examinations had been conducted. It was necessary that such approval should be voted in consequence of the modification of the regulations, which he thought had been very properly adopted by the Examiners. No doubt the meeting would be quite ready to sanction what had been done, and that they would receive with approbation the proposal that the Institute should give a course of lectures for the benefit of those who were studying for the examinations. He could only say that so far as his services were of value, he would readily do his share, and if others would do likewise, these lectures could be carried out without much difficulty.

Mr. C. FOWLER, Jun., Fellow, returned thanks on behalf of the Moderators, for the kind vote which had been given to them for their exertions. He would like to say one word on the question with regard to more time being required for the Examination. Perhaps the Moderators were better able to judge as to this point than the Examiners. Some men might perhaps be pretty well up in a subject, but had not got it so completely at their fingers' ends that they could write it off at once. They required a little time for thought, and sufficient time scarcely seemed to be allowed at present. The candidates certainly did not lose any time, and from the way in which they worked he should think they had never before done so much work in three days. It was from these circumstances that the Moderators had thrown out the suggestion in their report.

Mr. C. F. HAYWARD, Hon. Sec., would mention that Mr. Digby Wyatt, one of the Examiners last year, was unable to accept the office of Examiner this year, not because he wished in anywise to shirk these interesting though arduous duties which he felt he was almost bound to do if asked, but because a number of gentlemen in his office and in other business relations with himself were candidates for examination; and therefore, by the rules of the Institute, as stated in the regulations of the Examinations, he could not be one of the Examiners. It was the wish of Mr. Digby Wyatt that this should be now understood, although he (Mr. H.) had taken care to inform the Institute before, at the time the Examiners were appointed. Last year the Council gave the Honorary Secretaries permission—and no doubt the same permission would be extended to them this year—to explain to those candidates whose names did not appear in the successful list, if they chose, in what way they had failed, and in what particular branches they were more successful. In doing this friendly duty last year, he found that gentlemen generally were hardly aware of the importance of their being up to a certain standard in *every* branch of the subjects set down in the papers, and that knowing one or two subjects well was not sufficient. If they were good in all subjects but one, and yet failed to give a sufficient number of answers in this one, they must fail altogether. If this were well understood it might be a source of encouragement to those who had not succeeded, for they might know they were thoroughly up in drawing in design for instance, and yet, finding they did not pass would discover that they had overlooked one or more important branches of study. It ought to be a source of congratulation to students to know there was such a body as the Examiners to find out the particular points where they failed; and for his part, he should have been only too glad if such Examinations had been instituted years ago, whereby he could have found out the failings in his architectural education which daily experience in professional practice now taught him. He might also remind them that gentlemen not being eligible as Associates or regular students of this Institute could now, if they chose, come in as *Temporary Students*, with a view of being examined next year; and it was to be hoped that the library would thus be made use of, as it was now available to every gentleman in this way.

With regard to the many applications they had received for the publication called the "Regulations of the Examinations, &c.," he would explain that there was such a large demand for them, in the form as issued, that they were soon sold out; and as the next Examination was so near, the Council did not think it worth while to have them republished till after the present examination. They would now be revised and issued in the form of a small volume, as before, with the new papers of questions added; and within the next few weeks, gentlemen who applied would be able to get copies.

Referring to the desirability of special lectures, as had been suggested, he said he was delighted to hear the remarks that had been made on the subject, and he hoped they would enable the Council to carry out the suggestion. Other volunteers should follow the good example set by Professor Kerr in promising his active assistance. If gentlemen would be kind enough to inform them (the Honorary Secretaries) on what subject bearing upon the particular class of subjects embraced in the Examinations they would lecture, they would gladly avail themselves of the offer, and would make it their duty to arrange for as many lectures as possible on the "off-nights" of the session. He presumed these lectures would be entirely confined to the subjects necessary for the Examination.

Now the *Distinction* Examinations were opened, he trusted, instead of having two candidates for examination at a time, there would be a large increase next year in this particular class, as well as in the other. According to the analysis he held in his hand, which was prepared similar to that of last year, it was very evident that the Distinction candidates were well up to their work, inasmuch as the total full standard number of marks required to be obtained was 5,000, and the total number actually obtained was considerably more than 2,000 above this—taking no notice whatever of the allowance of marks permitted by the Council for this year. Of course, the exact number was not to be made known; but it was satisfactory that so many had been obtained beyond the necessary number in this the first Examination of the kind.

Professor Kerr thought he might direct attention to another subject. He understood that a somewhat important matter had occurred since the last meeting of the Institute in respect to their Scale of Charges. He believed those charges had been several times recognised in law proceedings, but in a trial which occurred the other day they were recognised more completely; and as he understood the Council were about to have the scale reprinted and circulated, it would be satisfactory to know that it was now fully accepted by Her Majesty's judges as evidence of custom. Another principle which he understood was established in the trial alluded to was one which might not be so thoroughly comprehended; at the same time it was interesting, if he had the right version of the matter. It was argued that a client had a right to dismiss his architect just as he would dismiss his medical man or his lawyer (that was the exact illustration) at any time he chose, paying him for his trouble up to the time of dismissal. But Lord Chief Justice Erle held that it was not so. That a person might dismiss his medical man or his solicitor and pay him to the time of his dismissal, was undisputed; but his Lordship said an architect was employed to do certain work as a whole, and that this work was not done, his retainer was not completely fulfilled, until all was finished; so that dismissal could not be effected upon the same terms as the dismissal of a lawyer or medical attendant. This was an interesting point, and it might be important for them to understand thoroughly what his lordship meant.

THE PAPERS OF QUESTIONS

USED IN THE

VOLUNTARY ARCHITECTURAL EXAMINATION,

HELD BY THE

Royal Institute of British Architects,

1864.

EXAMINERS - -	Arthur Ashpitel, V.P. F.S.A. T. Hayter Lewis, F.S.A. George Gilbert Scott, R.A. F.S.A.
MODERATORS -	Charles Fowler, Jun. Fellow. J. W. Papworth, Fellow.

NOTICE TO CANDIDATES.

Each Candidate is expected, on entering the Examination room, to proceed immediately to the seat that may be assigned to him; to maintain quiet and silence; to address himself only to the Moderators in case he may require explanation or assistance; and to conform to their arrangements.

Answers are to be written only on one side of the paper. A margin of about one inch is to be left on the left-hand side of each page; and the answer to each question is to be begun at the top of a fresh page. The division and number of each question is to be written in the margin opposite the first line of the answer. The Candidate's number is to be put at the opposite top corner of each page.

A larger number of questions has been given than it is expected the Candidates can answer in the time allotted. This is done in order that they may have the advantage of selection; and the Examiners wish to impress most earnestly upon the Candidates the necessity of attending to the correctness of the answers, rather than to the number of them.

The mathematical subjects must be strictly worked out: the propositions from Euclid and the riders are to be considered as distinct questions, and are to be answered separately. It is not necessary that the questions in Physics, Professional Practice, and Materials should be worked out, in detail, further than is requisite to show that the Candidate has a competent knowledge of the subject; but mere indication of the rule will not be a sufficient answer.

It must be clearly understood that the Examiners wish to develope and recognize what the Candidates do fairly know, and not to try and throw difficulties and perplexities in their way.

CLASS OF PROFICIENCY.

FIRST DAY.—MORNING.

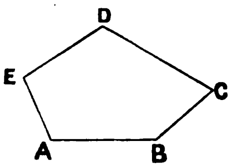
Design and Drawing.

One plan, elevation, and at least one section of a design for a Private Chapel with a timber roof; to be over a Library about 15 feet high in the clear, vaulted in brick or stone-work, in two bays longitudinally, *i.e.* with one row of pillars down the centre. The floor of the Library to be one foot above the level of ground adjoining. The staircase from the Library to the Chapel to be of incombustible materials, and to be vaulted. There is, also, to be an external staircase, with a porch, to the Chapel. To be in any style that the Candidate may select; and to be drawn (in pencil will be sufficient) *not sketched,* to a scale of $\frac{1}{8}$ of an inch to a foot: no colour but Indian ink is to be used.

FIRST DAY.—AFTERNOON.

Practical Geometrical Drawing.

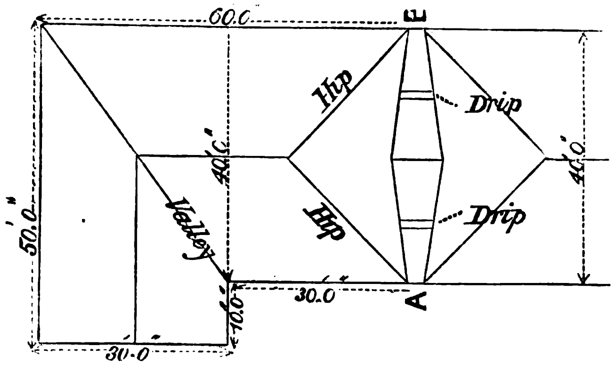
1. Draw the plan of a bay window of three sides; each of the canted sides being one half of the central face, and forming an angle of 55° with the wall of the house; and the width of the opening under the breastsumer being 12 feet.

2. Reduce this irregular figure  to a simple triangle by the parallel ruler only.

3. Draw the element of a Decorated Gothic clerestory window in the form of a spherical triangle, placing therein three equal spherical triangles with proper cuspings, &c. shewing the centres and points of contact of the curves.

4. Draw three parallelograms, 4 inches high by 3 inches base, and place therein by means of ordinates a semi-ellipse, a parabola, and a hyperbola.

5. A timber roof is of the form and dimensions as in margin, and the pitch is one-third of the span, shew the method of finding the lengths of the common rafters, hips, valleys, and ridges.



6. Referring to the above diagram, there is a middle gutter from A to B, falling both ways, 8 inches wide in the narrowest part, with a rise of 2 inches in every 10 feet, and with drips where shewn 2 inches high each,—what is the width of the lead above and below the drip and at the widest part, supposing it turns 7 inches up each lear board.

SECOND DAY.—MORNING.

MATHEMATICS.

Arithmetic.

N.B. The French mètre is 39·3708 English inches or 3·2809 English lineal feet: and the English foot is ·33527 French lineal mètre. The Florentine braccio is 22·98 English lineal inches, and the lira Toscana 7·82 pence sterling.

1. Suppose the French metrical system introduced into England, in what dimensions will you be compelled to specify—

Girders	8″ × 10″	2 in.	deal.
Joists	7″ × 2¼″	1½	do.
Heads and Sills	4″ × 3″	1¼	do.
Quarter	4″ × 2½″	¾	do.

What would be the expression for a square of flooring? What would a stick of timber, 48 ft. long and 14 in. square, cube to under both systems?

2. Suppose the introduction of the French system abandoned but a decimal system enforced, the English foot being retained as the unit; how would you square out the following dimensions—12 ft. 2 in. × 6 ft. 4 in.; 13 ft. 7 in. × 2 ft. 8 in.; 29 ft. 5 in. × 6 ft. 4 in.; and how would you cube out the timber as in the foregoing question.

3. Land in a certain Manor descends according to the custom of Gavelkind, *i.e.* all sons inherit their deceased father's property in equal undivided shares. A man dies leaving three sons A, B, and C: they die; A leaving 5 sons, B 3, and C 4 sons. One of C's sons buys the share of one of B's sons, and the shares of two of A's sons. How much of the estate has he, including his own paternal share?

4. Divide the same sum 3·1416 respectively by ·4, ·04, and by ·004 prefixing the proper number of decimals to each operation and shewing the reason.

5. If 24 men can excavate a foundation in 36 days in summer when they can make 12 hours a day each, how many days must be allowed for 30 men to do the same in winter, when they can only work 8 hours a day?

6. A cubic braccio of marble at Carrara is worth 11 Tuscan lire;—how much can it be sold for in London per English cubic foot, adding 12½ per cent. for freight and charges, and 15 per cent. profit?

7. To what will the following claim against a Railway Company amount properly carried out—

(*a*). A ground rent of £8. per annum for 7 years, and the reversion to the rack rent of a house worth £50. per annum in perpetuity afterwards, less 10 per cent. for losses and repairs, 5 per cent. collection and management, and insurance £600. @ 4s. 6d.

(*b*). A like ground rent of £10. per annum for 5 years, and the reversion to a rack rent of £80. per annum, subject to the like deductions, the insurance being for £1100. @ 4s. 6d.

(*c*). A piece of building ground 230 ft. front worth (unrealized) a ground rent of 6s. per foot, allowing 2 years peppercorn and 6 years to cover.

(Continued over.)

The ground rents to be taken on the 3 per cent. table—£1. per annum for 7 years tab. value$=6\cdot230$; for 5 years$=4\cdot579$. The reversion on the 6 per cent. table—£1. received at the end of 7 years tab. value$=\cdot6651$; of 5 years—$\cdot7473$.

The building ground to be taken on the 4 per cent. table—£1. receivable at the end of 5 years (3 years mean of 6 and the peppercorn) tab. value$=\cdot8219$.

Add 15 per cent. compulsory sale, and write out the whole fair as if to be handed up to a jury.

Algebra.

1. Add together $5a + 3b + 2c - 5$ and $3a - 2b + 2c - 2$; also $3ax^2 + 2by^2 - 8$, $-ax^2 + 2cy^2 - 10$, and $bx^2 + ay^2 + 20$.

2. State the rule for subtraction and give the reason for the same. What is the difference between $13a - 2b + 9c - 3d$ and $-4a - 6b + 9c - 10d$; also from $3x^2 + 2xy - y^2$ take $-x^2 - 3xy + 3y^2$, and from the remainder $3x^2 + 4xy - 5y^2$.

3. Extract the square root of $4x^4 - 28x^3 - 17x^2 + 6x + \frac{9}{4}$, and prove the result by involution.

4. Solve the following equations:—

$$(a)\quad 5(x+1) + 6(x+2) = 9(x+3).$$

$$(b)\quad \sqrt{12+x} = 2 + \sqrt{x}$$

$$(c)\quad 16x + 5 : \frac{4x+14}{9x+31} :: 36x + 10 : 1$$

$$(d)\quad (x+1)(y-9) = (y+7)(x+5) - 112$$

$$xy + y - 9x - 9 = xy + 7x + 5x + 35 - 112.$$

5. A builder can buy bright pavers for facing at 60s. per M, and good stocks at 36s.,—how many of each sort must he use to make his brickwork cost him 42s. per M?

6. On letting some land out of a large estate to a farmer agreeing that he would keep ten sheep for every acre under the plough, and would have also an acre of pasture for every four sheep he kept, he ultimately took 700 acres,—how many sheep should he have?

7. The formula for the strength of cast iron girders of proper section supported at both ends is

$$W = \frac{c\,a\,d}{l} \text{ where}$$

W the breaking weight in tons, the load being placed in the centre,
a = area of bottom flange in inches,
d = depth of girder in ditto,
l = span, or length between supports in ditto,
c = a constant averaging 25.

Transform this formula so as to shew how to find the area, or the depth, or the length as may be required.

Euclid. Book 1.

1. What is the difference between a postulate and an axiom? Of what use are they in the demonstrations?

2. Proposition 11. Problem—Draw a straight line at right angles to a given straight line from a given point in the same.

3. Describe an isosceles triangle, the base and one of its sides being given.

4. Proposition 32, Theorem Corollary 2; All the exterior angles of any rectilineal figure made by producing the sides successively in the same direction are together equal to four right angles.

5. A piece of ground is bounded by five sides of different lengths, and there are obstructions, so that the interior angles cannot be taken, on boning out the sides in succession the following external angles were taken, 72° 15′, 56° 10′, 45° 45′, 66° 30′, and 120° 10′. Shew there is a slight error here and how much it amounts to.

6. Proposition 34, Theorem; The opposite sides and angles of parallelograms are equal to one another, and the diameter bisects them, that is, divides them into two equal parts.

7. Bisect the parallelogram from any assumed point in one of the sides; also by a line drawn perpendicular to one of the sides.

8. Proposition 38, Theorem; Triangles upon equal bases and between the same parallels are equal to one another.

9. Divide an equilateral triangle into four equal triangles.

Book 2.

10. Proposition 7, Theorem; If a straight line be divided into any two parts the squares of the whole line, and one of the parts, are equal to twice the rectangle contained by the whole and that part, together with the square of the other part:

Prove this by Euclid's demonstration, and also (*if there be time*) algebraically.

11. Proposition 14. Problem. Describe a square equal to a given rectilineal figure.

SECOND DAY.—AFTERNOON.

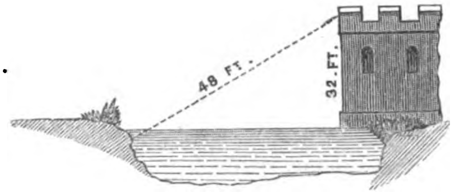
MENSURATION.

1. A circular grass plot, 15 yards in diameter, is enclosed by a circular gravel walk 7 ft. 6, *i.e.* 2½ yards wide,—what ground does each cover?

2. A cylindrical zinc cistern is 4 feet diameter and 6 feet deep,—how much water will it contain, reckoning 6 gallons and 1 pint to each cubic foot?

3. The apse of a church is in the form of half a semi-sphere, 20 feet in diameter, and is covered with 7 lb. lead; there are three lead rolls, averaging the width of 4 inches each, extra to the curved superficial measurement, a flashing next to the church 6 inches wide, and a gutter round the parapet 8 inches wide,—what will be its cost at 35s. per cwt. including solder, nails, &c. complete?

4. Wanting to know the width of a moat to an old castle, my friend drops a tape down from the top of the battlements till it touches the water, which he finds to be 32 feet; he then throws me the end, which I catch, and strain the tape across to the edge of the moat, as shewn by the dotted line, and find it measures 48 feet,—what is the width of the water?



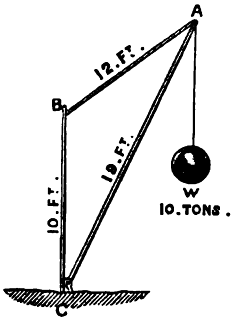
5. It is required to set out a circle for foot racing in a gymnasium to a public school, five times round, which shall be a measured mile,—what will be its diameter?

6. The old Winchester bushel was 18½ inches in diameter and 8 inches deep,—how much did that differ from the imperial bushel, containing 2218·192 cubic inches?

Physics.

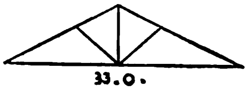
1. Give a short account of what have usually been termed the six mechanical powers. How many orders of levers are there; sketch them, shewing the fulcrum F, the power exerted P, and the weight W? Give the formula for the respective forces.

2. Explain the theorem called the parallelogram of forces, particularly as applied to a crane. Suppose suspended weight W = 10 tons; show by a diagram, to large scale of equal parts, the strains and the compressing forces on the various limbs; AC being the jib; AB the suspension rod; and BC the crane post. What is the strain upon the lower pintle C?



3. If a beam be supported at one end and loaded at the other, and will bear one ton; what will the same bear with the load equally distributed? If supported at both ends and loaded in the centre? If supported at both ends and the load equally distributed?

4. Apply the theory of the parallelogram of forces to a common king-post roof, one-third pitch, shew what parts are in compression; and what in tension, and in what proportion: supposing the trusses to be 10 ft. apart from centre to centre, and that the covering weighs 8 cwt. per square.?



5. What is the difference in specific gravity between heated and cold air. What often occurs when a fire has been made at night in a bed room and suffered to go out, and why? What is meant by a *plenum* and *vacuum* in ventilation. What are the causes of draughts; and the methods generally taken to prevent them?

6. What is meant by direct, diffused, and reflected light? If a high building is erected to the *north* of a client's windows in what way is he injured, and of what class of light is he deprived?

PROFESSIONAL PRACTICE, ESTIMATING, &c.

1. Give a short sketch of the clauses usually introduced into a contract, to ensure the completeness and efficiency of the various trades, the excellency of the materials and workmanship employed, and the time allotted for completion,—and add such clauses as will protect both the client and architect against claims for extras on works in the specification, and for other unauthorized and unjust charges.

2. What clauses should be introduced into a contract to render the builder liable for any hidden or concealed defects which may appear after the works are completed, and the accounts settled? What are the proper clauses with regard to roofs, drains, &c. which compel the builder to keep the same in repair for a reasonable time after the completion of the works.

3. How are approximate estimates of the probable cost of buildings usually made, when the rough plans are completed, and there is no time to take out proper detailed quantities?

4. What is the value of a rod of brick-work the walls 1½-brick thick, faced with stock bricks at 30s. per M. alongside, backed with and bonded to grizzles at 26s., wharfage 1s., and cartage 3s. per M.; the lime at 12s. per hundred, and sand at 3s. 6d. per yard, both delivered; the scaffolding and labor as usual; the profit 10 per cent. on the bricks, and 15 per cent. on the rest of the work? Give sketches to shew how the bricks should be laid so as to insure a perfect bond in this work, and also in two-brick work; and the ways in which this is often evaded.

5. Give a short account of the customary method of measuring brick-work in London, especially as to the deductions? How is cube brick-work converted into reduced? What is meant by ramps, rakes, bird's-mouths, and skew-coins? How are they usually taken and priced? The like of sailing courses, dentil courses, single and double tile creasing, and any other similar work you may remember.

6. What is the customary method of measuring timber in London, when completed and fixed in a building?

If fir be worth £4. 5s. per load delivered into the builder's yard, put the price to the following items, allowing 15 per cent. profit.—

Fir—no labor.
Do. in bond, plates, lintels, and wood bricks.
Do. framed in floors.
Do. do. in roofs.
Do. wrought framed in ditto.
Do. in proper solid door and window frames.

7. To what dilapidations are tenants from year to year subject? If a tenant holds a house for a short term under the simple covenants "to uphold and maintain," how would you treat the question of papering and painting?

THIRD DAY.—MORNING.

Materials.

1. What is meant by the word concrete, and what are its uses? What is it composed of and in what proportions?

2. What are the descriptions of lime generally in use? State the various qualities of chalk lime, that which is called grey stone lime, blue lias, and any other specimens you may have seen used.

3. What is the difference between kiln and clamp burnt bricks, and in what parts of the manufacture are the chief differences? Clamp burnt bricks are divided into two great divisions, commons and malms;—what are the subdivisions of each, and what are their uses and qualities?

4. What are the advantages and disadvantages of compressed bricks, and of perforated bricks? Where are the best red, white, or yellow facing bricks usually obtained from? What process of manufacture gives the best malms the peculiarly bright yellow hue?

5. Of what nature is Kentish rag stone, and whence is it obtained, and how is it generally worked? Shew by sketches the various ways in which it is used, as rough rag in foundations, random work, random-coursed work, regular coursed work, header work, arris-tooled quoins, and any other sorts you may remember. If backed with bricks how should it be bonded?

6. What are the other principal stones in use about London? Name as many as you can recollect, under the heads of primary or secondary stones, oolitic lime stones, magnesian lime stones, grit and other sand stones, &c.

7. What are the various species of fir timber generally in use in this country? What are the different names and qualities of the various sorts of Baltic and Archangel timber? Describe the various sorts brought from Canada and North America, and shew the very great difference between them in quality. What are the usual lengths of the sticks of timber imported, and what will they square to, without considering "out-sized" samples?

Construction.

Each candidate will draw one or more of the following details (to the scales as stated below) of the work he has done on the first day. He may improve on the character of his design therein.

One bay of the groining: plan, sections, &c. carried out as complete working drawings to a ¾ in. scale, with sections of the ribs, &c. to quarter full size.

One bay of the roof to ½ in. scale, shewing the framing, caulkings to plate, construction of curved braces, junction of principals and ridge, iron bolts, straps and ties, and other detail.

One of the principal windows (with plan) to ½ in. scale; the mouldings to quarter full size.

It is essential that each Candidate should append to the above a detailed specification of the work in each of the above subjects that he undertakes.

HISTORY AND LITERATURE.

1. Give an outline of the characteristics of the principal styles of architecture in Europe.

2. Give an account of the principal characteristics and history of any one style selected by the Candidate.

Inasmuch as the different Candidates have signified their desire to be examined, some in one stated branch, and some in several of various styles of architecture, and as separate sets of questions on each style would run to a most inconvenient length and be productive of great confusion, the Examiners have thought it better to request each Candidate to write a short, clear and comprehensive thesis on the particular style or styles of which he has already made choice, according to the marginal note which will be made by the Moderators on this paper when it is delivered to him. In awarding the marks no preference will be given to the selection of any one style before another; but the allotment of marks for the second question will depend on the knowledge and discrimination evinced by each Candidate in the treatment of those branches of architecture which he has selected.

The thesis is to be written in plain clear English, avoiding a loose incorrect style, and at the same time not affecting fine writing; and is to be illustrated plentifully in the margin by sketches of the various details to which allusion may be required. The following instructions to be strictly observed.

In *Classic Architecture*, in addition to the general history and description of the *Greek* style, careful notice should be taken of the succession and contour of the mouldings, the proportion of the orders, the character of the foliages and other ornamentation, and particularly the difference between the early examples, those of the age of Pericles, and the debasement under Hadrian.

If *Roman Architecture* be the subject selected, there should be a careful comparison of the various orders and their details, particularly the mouldings, capitals, bases, and other parts of the ordonnance.

If the *later period of the Roman Emperors* be selected, the variations in detail from the ancient types, as twisted columns, arcades without architraves, and other similar changes should be noticed.

In treating of the *Romanesque* and *Norman*, the transition from the plainer to the more elaborate forms should be noticed, the characteristics of the architecture supposed to be *Saxon*, that of the reign of the 1st and 2nd William and that of Henry II, including the early use of the pointed arch, the interlaced system of arcading, and the other salient points of the *Anglo-Norman.*

The architecture called *Early English* should be described with all its differences from the Norman, the changes of the shafted columns, piers and arches, groining, windows, and other details, as will be enumerated below; also the transition to the *Geometrical Gothic.*

If the *Decorated* period or fourteenth century architecture be selected, the like differences should be described, and particularly the various systems of tracery, whether geometrical, net-like, flowing or leaf-like, and the transition to the architecture peculiar to the fifteenth century.

The *Perpendicular* should be treated in the same way, tracing its changes down to the corrupt or *debased* period.

In treating of the *Mediæval styles*, describe the characteristics of the piers and arches; the pitch of the roofs, and their design (if of timber), and the groinings (if of stone), with their varied forms, and the nature, disposition and names of the different ribs; the arrangement of doors and windows with their decorations, tracery, &c.; the state of art as to the carving of figures, foliages, &c. must also be given; and, if there be time, the leading features of the various mouldings, and the manner of their disposition; the capitals, bases; plans of piers; the parapets; buttresses, with their set-offs, or gablets; string courses, and base tables; the characteristic ornaments, as the dog-tooth, ball-flower, crockets, finials, and any other peculiarity that marks the period should be shortly touched upon.

Some Candidates having desired to shew their knowledge of the *foreign styles* of *Mediæval* architecture, the same remarks as well as the following will apply. The characteristic differences between the *circular* styles and the *pointed* should be noticed: and the transition to the *rayonnant* and *flamboyant* styles, which should be fully described; as well as that of the period before the great change when the Gothic styles passed into those of *François I*, &c., particularly as exhibited in France, the Low Countries and Germany. In *Italian Gothic* the Lombardic should be noticed and its transition to the first pointed, and thence to the more decorated styles. The characteristics of decoration, particularly as to the use of coloured materials and terra cotta, the pitch and materials of the Italian roofs, should be noticed.

Where a Candidate has chosen the style generally called *Elizabethan*, the gradual introduction of Classic details should be described, at the time when part of the work bears a Gothic stamp; and the way in which the last of the Gothic details gradually disappeared should be mentioned.

An account of *Revived classic architecture* should treat of the three periods, that of Bramante, Michael Angelo, and Raffaelle; that of Palladio, Vignola, and Scamozzi; and that of Borromini and his followers: reference should also be had to the works of Inigo Jones, Sir Christopher Wren, or any other architects of this country; and to the form which *Revived Classic Architecture* has assumed during the last hundred years in France and Germany.

In treating of the *Literature* it will be sufficient to name the principal authors on each style, with a short notice of the time in which they wrote, and the nature of their subject. It will be well also to note the authors who have contributed to the *revival of Mediæval art*, and its progress during the present century.

CLASS OF DISTINCTION.

FIRST DAY.

Give a design for a Banquetting Hall for a City Company (the interior only), about 100 to 120 feet long, in any style the candidate may select. The drawings to be to the scale of one eighth of an inch to a foot; with details and decoration to a larger scale as may be found convenient: the use of colour is permitted.

The candidate will also execute a specimen of modelling, or make a large scale drawing from one of the several casts which will be provided.

SECOND DAY.

Algebra, including Quadratic Equations.

1. Multiply x^2, x, $\sqrt{x}$, and $\sqrt[3]{x}$ each by $\sqrt{x}$, and express the result by fractional indices.

2. Square $a+b-c$ as written, and also as a binomial expression by the use of brackets.

3. Divide 1, by $1+2x+x^2$ to four terms, also $ax^3-(a^2+b)\,x^2+b^2$ by $ax-b$.

4. Prove the surd $\dfrac{1}{x-\sqrt{x^2-1}}+\dfrac{1}{x+\sqrt{x^2+1}}=2x$ also $2\sqrt[3]{2x}+6\sqrt[6]{4x^2}+\sqrt[9]{8x^3}=9\sqrt[3]{2}x$

5. Solve the following simple equations:

(*a*) $\sqrt{(a-x)}=\dfrac{a}{\sqrt{(a-x)}}-x.$

(*b*) $x+1 : y :: 5 : 3$

and $\dfrac{2x}{3}-\dfrac{5-y}{2}=\dfrac{41}{12}-\dfrac{2x-1}{4}$

6. Also solve (*a*) $\dfrac{10}{x}-\dfrac{14-2x}{x^2}=\dfrac{22}{9}$

(*b*) $\sqrt{(x+6)}+\sqrt{(x+3)}=3\sqrt{x}$

(*c*) $x+5=\sqrt{(x+5)}+6$

(*d*) $x+y : x-y :: 13 : 5$ and $y^2+x=25$

7. A chancel of a church is paved in the centre (which measures 18 feet by 12 feet wide) with sets of encaustic tiles, each 6 in. square, or a set of 4 to each foot superficial, the margin is to be paved with another class of tile and takes exactly as many sets. How wide is it?

8. The floor of a room has just been relaid, and has taken exactly 30 squares superficial boarding, one side is known to be 10 feet longer than the other, what are its dimensions?

9. A building speculation being unfortunate, the assignee makes a call of £720. on the shareholders, but two being insolvent he makes a further call of £5. each on the others. How many shareholders were there in the original company?

EUCLID.—*Book III.*

1. Proposition 35. Theorem. If two straight lines cut one another within a circle, the rectangle contained by the segments of one of them, is equal to the rectangle contained by the segments of the other.

2. A projected railway having been surveyed through an estate I ask the engineer where the line will pass exactly: all he will tell me is, "it forms only one curve from a point A to B and the rise or versed sine is 6 chains," I measure the chord (A to B) which is 44 chains, how can I find the radius of the curve?

Book IV.

3. Proposition V. Problem. To describe a circle about a triangle.

4. On asking a similar question as to another part of the same line, the same engineer sends me a map with three dots on it which he says are points in the curve. Assume three similar points, find the radius and draw the circle.

5. Proposition 11. Problem. To inscribe an equilateral and equiangular pentagon in a circle.

6. Shew from this how a right angle may be divided into five equal angles.

Book VI.

7. Proposition 12. Problem. To find a fourth proportional to three given straight lines.

8. Shew by help of a scale of equal parts how a rule of three sum may be solved geometrically.

9. Proposition 19. Theorem. Similar triangles are to one another in the duplicate ratio of their homologous sides.

10. If the superficial content of a triangle which has a base of 40 feet is 800 feet, what is the content of one exactly similar which has a base of 60 feet?

PLANE TRIGONOMETRY, LOGARITHMS, &c.

1. Define a logarithm, and state its general use. What is called the arithmetical complement, what the characteristic, and what the mantissa?

Resolve the following questions:

(*a*) If 5491 : 3144 be 2366, find a fourth proportional

(*b*) Divide 8·40 by ·96.

(*c*) What is the square of 1·21, and the cube of ·46.

(*d*) What is the square root of 8464, and the cube roots of 6896, and 68·96.

2. Define and describe by a diagram a sine, co-sine, tangent, co-tangent, secant, co-secant, versed sine and co-versed sine; also the complement and supplement of an angle.

3. Prove the following theorems:

$\sqrt{\mathit{rad}^2 - \mathit{cos}^2}$, or $\sqrt{1 - \mathit{cos}^2} = \mathit{sine}$

$\sqrt{\mathit{rad}^2 - \mathit{sin}^2}$, or $\sqrt{1 - \mathit{sin}^2} = \mathit{co\text{-}sine}$

$$\frac{\mathit{sine}}{\mathit{co\text{-}sine}} = \mathit{tangent}$$

$\mathit{rad}^2 + \mathit{tang}^2 = \mathit{sec}^2$, or $\frac{1}{\mathit{cos}} = \mathit{secant}$

4. Being about to erect a tropical plant house, I wish to know the height of the tallest palm in a neighbouring establishment. Fixing my instrument one and a half chains from the tree, 4·9 above the level ground, I observe the angle to the top 21° 31′. How high is the tree?

5. At Charleston it was observed that a gun from one of the forts was discharged and the sound reached the ear in 4 seconds; at the same time the sound of a gun from one of the monitors reached the ear in 6 seconds, and the angle between the ship and the fort was observed 48° 12′. How far were they from one another, supposing sound moves at the rate of 1142 feet per second?

NATURAL PHILOSOPHY AND PHYSICS APPLIED TO CONSTRUCTIVE PURPOSES.

The *very large range* which the Candidates have taken in desiring to be examined on the *whole* of the above sciences, and the *shortness of time* available, renders it necessary to compress the following questions into the closest form. They have, however, been so set that the replies may be extended by entering into the theories at greater length, as time may permit. Candidates are again reminded that the correctness of the answers will be much more valued than the quantity of matter written out, and that they should all bear on constructive matters as much as possible.

1. *Statics.*—What is called the "vis inertiæ?" What is meant by force and resistance; by direct and lateral compression; by extension, or rending strains; and by torsion? How is the strength of various beams usually ascertained; and what is generally considered their best sections in wood, cast iron, and in wrought iron?

2. *Dynamics.*—Show what is meant by equilibrium, and how it may be disturbed by various forces. State how the respective effects of these are usually ascertained by the theorem called the parallelogram of forces, and give such instances as time will permit. State the great law of motion as to gain of power and of time, and exemplify the same by a system of two or more pulleys.

3. *Pneumatics and Hydrostatics.*—Explain what is meant by the pressure of the atmosphere. Exhibit its action by a short description of a sucking-pump. Supposing the exposed surface on the top of a steam-boiler to be 25 feet long and 5 feet wide, what will be the pressure of the air thereon if a vacuum is allowed to be formed?

4. *Hydraulics.*—Give a short account of the pressure of fluids; and how to estimate the same. A large liquor back has a side 10 ft. wide by 9 ft. deep, what is the pressure of the water therein, disregarding barometric variations? Describe the hydraulic press. If the plunger is ½ in. diameter, and the ram 10 in. and a pressure of 500 lbs. put on the piston, what will the ram raise? Give the theory and distinguish between this machine and what is called the hydrostatic paradox.

5. *Chemistry.*—What are the laws of chemical combination by volume or otherwise. Explain what is meant by the terms carbonates, sesquicarbonates, and bicarbonates; oxides, binoxides, and peroxides; sulphurous, and sulphuric; hyphosulphurous, and hyposulphuric acids, or any of them. What is meant by chemical equivalents, and by symbolical notation? What are the symbols for water, potassa, hydrochloric acid, sulphuric acid, and any other you may remember. What is the base of lime, in what form is it generally found? What changes take place in the burning, slacking and setting this important material? If time will permit define poor, rich, and hydraulic limes, with their characteristics and uses.

6. *Electricity and Galvanism.*—Give a short account of the manner in which this fluid is generated. What is meant by positive and negative electricity, and in what manner are these developed by the ordinary machines? What is meant by the electrical discharge? Describe the dielectric state of the air in a heavy storm, and the supposed cause of thunder and lightning. What is the best form of lightning conductor; how should it be insulated, and where should it terminate? Show the method of generating galvanism, and the effects of making and breaking the currents. Give a short account of the electric telegraph, with its modern use in large public buildings; also in conveying messages from a city to a west-end office, and other similar purposes.

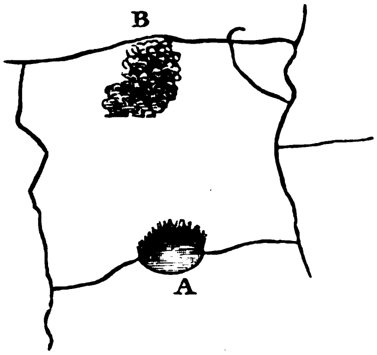
7. *Geology.*—Give a short epitome of the system on which the various rocks are generally classified. From which class do we obtain granite, and what are its component parts? What species of the igneous rocks are sometimes used in buildings? To what class does slate belong? The like of magnesian limestone; why is it supposed to decay so much in the metropolis? Which is the oolitic or Jurassic formation, and what stones do we obtain from it? Whence do our best marbles come, and how are they distinguished from lime stones? What is meant by the lamination of stone, and (in case of sand stones) how is it supposed to be occasioned? Of what class are York slabs, Bramley Fall, Whitby, and Park Spring stones?

8. *Acoustics.*—What is meant by sound, and what are its conductors and non-conductors? What is the difference between resonance and noise? Explain the undulations of sound and why some are pleasing and some dissonant and offensive to the ear. Shew also that undulations are reflected back from various substances, and that this reverberation may be smooth and pleasing, or confused and jarring, and why? What is the probable cause why rooms which are built of dimensions which are equi-multiples of each other are favorable to sound, and the reverse? What forms of ceiling are considered best for assisting hearing; which should you prefer, a flat ceiling with deep coffers, a semi-circular, or an elliptic form? What is the best form for the end of an oblong room when a speaker, or musician, is at the other end? Large square rooms have frequently an unpleasant echo especially when empty, the shutting of a door will cause a very loud and jarring sound,—how is this defect best cured, and why? If you wished to give peculiar resonance to a room, how would you construct the story beneath it, and with what material would you line the walls and ceiling? What are the best arrangements for seats in a concert room or theatre both for hearing and seeing?

9. *Colour.*—Which are considered the primary colours. Shew that from a mixture of these the secondary colours are obtained, and from these last the tertiary. Give the names lately affixed to all of them. What are the contrasting or complementary colours to the various primary and secondary? What is meant by the "harmony of analogy" and the "harmony of contrast" of colour; and by "contrast of tone" and "contrast of colour"? What is the theory of Mr. Owen Jones as to the decoration of surfaces, when only the three primary colours may be used; which should decorate the advancing surfaces, which the receding, and which the undersides? What is meant by power in colour, and what should be the relative strengths when some colours are used in large surfaces and others but sparingly? What is the reason why monochrome decoration, well treated, is often more pleasing than the most brilliant colours if not thoroughly well assorted.

Land Surveying.

1. The enclosed is the sketch of a field: shew how you would stake it out for surveying by the chain only, supposing A to be a pond you cannot cross, and B a wood which you can neither traverse nor see across, and that the adjacent owners will not allow you to go on their ground. Give also a specimen of how you would keep your field book, shewing the off-sets, &c.



Scale ¼ inch to a chain.

2. Describe a theodolite with its various parts, and the method of adjustment previous to taking horizontal angles. Supposing the land in the foregoing diagram to be covered wholly with thick underwood, and only accessible from the *outside*, how would you proceed to survey it by the theodolite, working from the needle?

3. X Y and Z buy a small triangular field for £ 100. The base A B measures 10 chains; the side A C 7·45 chains, and C B 6·22 chains. The only access is by a road at the apex C. Divide the land equitably among them, supposing X paid £ 20., Y £ 30. and Z £ 50, and giving them all access to the road.

4. How do you ascertain to which owner a park pale or other boarded fence (dividing two properties) belongs? The like of a hedge and ditch. If the edge of the latter is much trodden in, what is the fair width to take, measuring from the centre of the bank?

Languages.

Greek.

From Dionysius of Halicarnassus, (*Antiq. Roman. lib.* iv. *cap.* 61), *The Capitol.*

'Ακόυσας δε ὁ Ταρκύνιος, ἐπέστησε τοῖς ἔργοις τοὺς τεχνίτας· καὶ τὰ μὲν πολλὰ ἐξειργάσατο τôυ ναôυ, τελειῶσαι δ' ὀυκ ἔφθασεν ἅπαν τὸ ἔργον, ἐκπεσὼν τάχιον ἐκ τῆς δυναστείας, ἀλλ' ἐπὶ τῆς τρίτης ὑπατέιας ἡ Ρωμαίων πόλις ἀυτὸν ἐις συντέλειαν ἐξειργάσατο. 'Εποίηθη δ' ἔπι κρηπῖδος ὑψηλῆς βεβηκὼς ὀκτάπλεθρος τόν περίοδον, διακοσίων ποδῶν ἔγγιστα τὴν πλευρὰν ἔχων ἑκάστην. ὀλίγον δ' ἔτι τὸ διαλλάττον ἕυροι τὶς ἂν τῆς ὑπεροχῆς τοῦ μήκους παρὰ τὸ πλάτος ὀυδ' ὅλων πεντεκαίδεκα ποδῶν. . . . 'Εκ μὲν ὄυ κατὰ πρόσωπον μέρους πρὸς μεσημβρίαν βλέποντος τριπλῷ περιλαμβενομενος στίχῳ κιόνων, ἐκ δὲ τῶν πλαγίων διπλῷ. ἐν δὲ ἀυτῷ τρεῖς ἔνεστι σηκοὶ παραλληλοι, κοινυς ἔχοντες πλευράς. μέσος μὲν, ὁ τôυ Διός· παρ' ἐκάτερον δὲ τό μέρος, ὅ, τε τῆς 'Ηρας κὰι ὁ τῆς Αθηνᾶς, ὑφ' ἑνôς ἀετοῦ, καὶ μιᾶς στέγης καλυπτόμενοι.

What parts of speech are the following words, whence are they derived, and what is their meaning,—*έπὲστησε*—*ἔφθασεν*—*ἐκπεσὼν*—*ὑπατείας* and *δυναστέιας* (distinguish between these two.)

What is the difference between *κρηπίς* and *θεμέλιος*—*ὀροφή* and *στεγη*?

Define *ἱερος*, *ναός*, and *σηκος*.

In what respects did the Temple in the Capitol differ from others? by whom was it founded? by whom was it burned? and by whom was it finally restored?

Latin.

From Ovid. *Tristia.* (*Lib.* 3, *Eleg.* 1, *line* 25.) *The Roman Forum viewed by a Stranger.*

Duc age, namque sequor, quamvis terrâque marique
Longinquo referam lassus ab orbe pedem.
Paruit, et ducens, Hæc sunt Fora Cæsaris, inquit;
Hæc est à Sacris quæ via nomen habet.
Hîc focus est Vestæ; qui Pallada servat et ignem.
Hic fuit antiqui regia parva Numæ.
Inde petens dextram, Porta est, ait ista Palatî:
Hîc Stator: hoc primum condita Roma loco est
Singula dum miror; video fulgentibus armis
Conspicuos postes, tectaque digna Deo.

Give the meaning of the various terms, "fora," and why is this plural, "focus," "regia," "Porta," "Palatî," "postes;" also a short account of the origin and history of any of the buildings named above, if time will allow of it.

From Vitruvius. (*Lib. IV*, *cap.* 2.)

In ædificiis omnibus insuper collocatur *materiatio*, variis vocabulis nominata. Ea autem, uti in nominationibus, ita in re varias habet utilitates. *Trabes* enim supra *columnas*, et *parastatas*, et *antas* ponuntur in *contignationibus tigna* et *axes*, sub tectis, si majora spatia sunt, *columen* in summo *fastigio* culminis, unde et *columnæ* dicuntur, et *transtra* et *capreoli;* si commoda *columen* et *canterii* prominentes ad extremam *subgrundationem*. Super canterios *templa*, deinde insuper sub tegulas *asseres* ita prominentes ut parietes projecturis eorum tegantur.

Translate the foregoing passage; giving any explanation that may be necessary of the words in italics, in foot notes.

Give the Latin equivalent terms for the Base, Shaft, Flutes, Necking, Ovolo, and Upper member of a column; also for an Architrave, Frieze, Triglyphs, &c. and the Bed mouldings, the Plain face, and the large Upper mouldings of a cornice, with as many of their derivations as you may recollect.

French.

Translate from "La Loi du 3 Mai 1841," "De l'Expropriation pour cause d'utilité publique," (the Law analagous to our Lands Clauses Act) the following passages:

Titre IV. Du rêglement des Indemnités. Mesures préparatoires.

Art. 21.—Dans la *huitaine* qui suit la notification préscrite par l'art. 15, le *propriétaire* est tenu d'appeler et de faire connaître à l'*administration* les *fermiers, locataires,* ceux qui ont des droits d'*usufruit*, d'*habitation*, d'*usage*, tels qu'ils sont reglés par le Code civil..

Art. 23.—L'Administration notifie aux propriétaires et à tous autres intéressés qui auront été designés, ou qui seront intervenus dans le délai fixé par l'Art. 21, les sommes qu'elle offre pour *indemnité*. . . . . .

Art. 24.—Dans la *quinzaine* suivante, les propriétaires et autres intéressés sont tenu de declarer leur acceptation; ou, s'ils n'acceptent pas les offres qui leur seront faites d'indiquer le *montant* de leur *prétention*.

Translate from "Clauses et Conditions Générales, imposées aux Entrepreneurs," or the Conditions for Contractors published by the French Government.

Art. 18.—*L'entrepreneur* aura soin de ne choisir pour *commis*, *maîtres* et *chefs d'ateliers*, que de gens probes, intelligents, capables d'aider et même de remplacer au besoin dans la conduite et le métrage des travaux. Il choisira également les ouvriers les plus habiles et les plus expérimentés, et néanmoins il demeurera responsable en son propre et privé nom, comme en celui de la caution, des *fraudes* ou *malfaçons* que ses agents pourront commettre sur les fournitures la qualité et l'emploi des matériaux, sous les peines indiquées à l'art. 12.

If there is time make any short comments on the words in italics, shew the difference between *propriétaire*, *fermier*, *locataire*, the rights of *usufruit*, *habitation*, *usage*, or any other technical terms you may be acquainted with.

The "prix de règlement," or "Builder's Price Book," issued by the French Government, contains the following trades:

Terrasse
Maçonnerie
Carrelage
Pavage
Granit
Asphalte et lava fusible
Ardoiserie d'Angers
Charpente
Couverture
Plomberie et Zincage
Canalisation pour le gaz
Menuiserie
Serrurerie
Fumisterie
Peinture
Dorure
Tenture
Vitrerie
Stuc
Marbrerie
Miroiterie
Vidange

Translate these terms into English, also as many of the following terms as time will permit—Ferme, Sabliéres, Tirant, Entrail, Poinçon, Poinçons ajoutés, Arbalétrier, Pannes, Chatignolles, Liens, Chevrons, Faîte, Faîtage, Coyaux, Boulon, Cheville, Trait de Jupitre, Queue d'hirondelle; and translate into French—Bed of a stone, Arch, Flying buttress, Vault, Cradle vault, Rib of a groin, Header and stretcher of a brick, Jamb, Lintel, Pediment, Tower, Spire, Turret, and Finial.

Professional Practice, Estimating, &c.

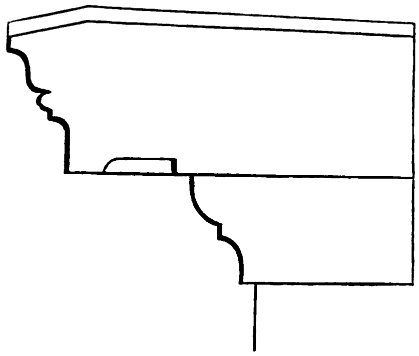
1. State the various duties to be performed by an architect, from the first general consultation with his client as to erecting a large building to the commencement of the works, to the completion and settlement of the accounts.

2. What are the duties of the clerk of works, and how is he generally selected? What are the duties of the builder under a usual contract? In case of a failure exhibiting itself in a building after its completion, as settlements, sinking of floors, unsoundness of roofs, dry-rot, &c., what parties are expected legally and morally to bear the blame, and the expense of reparation?

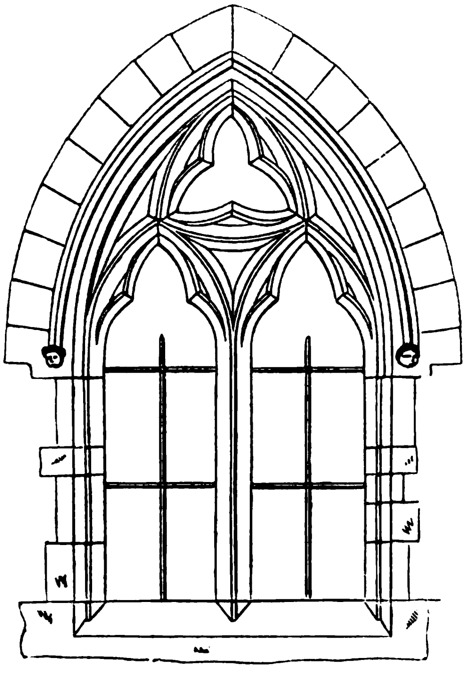
3. What are called "provisions" in a contract, and what clauses should be inserted therein to protect a client and architect from charges of extras on their execution, as well as from liability to third parties from whom articles, as chimney pieces, plate glass, &c. may have been obtained, in case of failure of the contractor?

4. What are the usual forms of certificates for payment of money from time to time, and also the final certificate for satisfactory completion? What precaution should be taken in giving this, so as to guard against the future discovery of work which may have been improperly executed, but so masked and hidden-up at the time as to deceive the parties who have had the superintendence of the same?

5. Below is the section of a Portland stone cornice to scale: shew the principle on which you would measure and value the same. What is meant by "cubic stones on the banquer," and how is this measured? Where would you take sawing and where only half sawing? Where beds and joints, joggles, &c.? Where would you allow plain and sunk work preparatory to taking the moulded work? What are the sinkings for drips, and what are the water joints, and how are they formed? How would you take care that such a cornice is well tailed down, or counterbalanced, to prevent accidents.



6. In the margin is a Gothic window with geometrical tracery. Suppose this to be executed of Caen stone, how would you take out the quantities for valuing the same, including glass grooves, saddle bars and stanchions, rough relieving arches, and everything except lead lights, and glass?



Scale ½ inch to the foot.

7. What are the rules laid down by the Courts for taking Ecclesiastical Dilapidations? Under what circumstances can painting and papering come into your valuation? How would you estimate the repairs to park paling and other fencing? What items can you take as to the Chancel, and what are expressly excluded?

8. State shortly what circumstances will set aside the Award of an Umpire; supposing the submission to have been properly drawn and stamped, and all the usual formalities strictly complied with.

THIRD DAY.

MATERIALS.

1. The geological character of the various stones having been given, write a short account of—

   (*a*). Those in most frequent use in London, with remarks as to their comparative fitness for various purposes.

   (*b*). Their texture, appearance, colour, cost, and the usual way of working them, and the comparative value of the labour on each.

   (*c*). The like of any stones in local districts, with the use of which you may be acquainted.

   (*d*). What stones have been used at St. Paul's, the restoration to Henry VII's Chapel, the entrance portico at Euston Square, S. Dunstan's in the West, and the Houses of Parliament, or any other buildings you may recollect, and in what state are they now?

2. What is the usual time of year for felling oak timber, and why? At what time should it be felled, and how should it be seasoned if used in good work? From what parts of the world do we get the best foreign oak, both for carpentry and joinery? What is the ordinary objection to American oak when used for the former purpose? There has been much debate lately as to whether the timber in the old Mediæval churches is oak, or chestnut; if you have given attention to the subject, state the points of the controversy, and give your opinion thereon. What is called the sap of a tree, and what are the objections to its use?

3. What is Dry Rot, how is it generally caused, and what is its best cure? How does this differ from Eremacausis, or natural decay in dry places, or from the wet rot? What processes have been tried to arrest decay in timber of various kinds, and how have they succeeded?

4. What are the different qualities of fir timber obtained from the Baltic, Swedish, and Russian Ports? Give their names and chief characteristics. The like of Canadian timber. For what purposes may yellow pine be used with advantage, and what are its disadvantages for all other purposes? What are the characteristics of pitch pine, where may it be used, and after what precautions?

5. What are the essentials of good mortar; how would you judge of the quality of sand, and of lime? State the different sorts of the latter in general use, and explain what is meant by rich, poor, and hydraulic limes. By what artificial means can any of the former qualities be converted into a species of hydraulic mortar? What do the bricklayers mean when they say the mortar is "too fat"? If it has too little, or too much lime, what are the disadvantages. When may grout be used, and when is it injurious to the work? In what respects are "closers" or "closures" necessary to make good brick bond?

6. What sorts of mahogany are used in joiner's work, whence are they imported, what are the characteristics of each, and in what parts of buildings are they generally worked? If cedar, teak, green-heart, or any other unusual wood, has been used under your notice give an account of the same, with your opinions thereon.

CONSTRUCTION.

Nos. 2, 4, and 6 should be answered.

1. An octagonal stone spire, 70 feet high, 13 feet across at bottom, has been struck with lightning, and needs repair. Show by sketches the mode in which a scaffold should be erected so as to effect the same. There is good perpendicular bearing on the flat of the tower, and ledgers may be rigged out of the tower windows, but the scaffold must not touch the spire in any part. If it be necessary to take the whole down, and to replace it with one of timber covered with lead, how would you design the framing, if of fir; what precaution should be taken to guard against twisting or buckling; and how should it be secured to prevent accidents from high winds?

2. Sketch a simple collar beam roof, 26 feet span and 20 feet pitch, the collar 9 feet up the principal rafter. Show the weak points as regards the timbers, and the power tending to overthrow the walls, assuming a weight of 7lbs. per superficial foot, and that the trusses are 10 feet apart. If the walls are of brickwork, 21 feet high, how thick should they be? Show, also, the line of thrust, and the best section of buttresses to resist the same.

3. Show how the same roof may be strengthened by extra struts, by curved braces, or by hammer beams. What is the best method of constructing curved braces? Show how large semicircular roofs can be erected by using timber in thicknesses. Which is the best system, where thicknesses are put together on the flat, or side by side, and why? How are the heading joints made? State any large roofs you may remember to be covered on this principle.

4. In covering ordinary roofs, show how the plumbers' work should be executed, particularly the flashings and drips? What is meant by "bossing out" the cesspool heads of the gutters, and why is this done? What is meant by "burning in" flashings in stone parapets? Show by sketches the gutter boards, lear boards, and eaves courses of a roof covered with duchess slates. Sketch, also, a portion of the roof, supposing it to be one-third pitch, and showing to scale the proper lap and bond of the slates. Sketch, also, the timber ridge, the rounded roll, slates, lead, &c. complete.

5. Some semi-elliptical groins being about to be erected 18 feet square on plan in the clear, with a rise of 6 feet, and the clerk of works, and builders not being able to set out the lines for the centreing, show how it should be done both in direct section and on the "groin point," or line of the intersection of the vaulting.

6. Show how to strengthen timber girders—
   (*a*). By trussing with oak, and iron bolts.
   (*b*). The like with tension rods beneath.
   (*c*). By the use of flitches of boiler plate.

Show also how wrought iron girders of great span are constructed, with sketches of the top and bottom flanges, angle iron, T iron, stays, &c. Give the general principles, and as many of the special formulas as you can recollect for ascertaining the relative strength of—

(*a*). Girders of fir.
(*b*). Oak.
(*c*). Cast iron of usual section.
(*d*). Wrought ditto.
(*e*). Story posts or columns of cast iron.
(*f*). Oak.
(*g*). Deal.

HISTORY AND LITERATURE.

The Regulations for this Class prescribe a notice of the structures, architects, writers on Practice and Theory, and works illustrating styles or structures, in any style or styles named by the Candidate; but regarding the limited number of Candidates, and the styles selected by them, the Examiners have thought it better, on the present occasion, to request each Candidate to write a clear and comprehensive thesis on the particular style or styles of which he has already made choice, according to the marginal note which will be made by the Moderators on this paper when it is delivered to him. In awarding the marks no preference will be given to the selection of any one style before another; but the allotment of marks will wholly depend on the knowledge and discrimination evinced by each Candidate in the treatment of those branches of architecture which he has selected. The thesis is to be written in plain clear English, avoiding a loose incorrect style, and at the same time not affecting fine writing; and is to be illustrated in the margin by sketches of the various details to which allusion may be required. The following instructions to be strictly observed.

In treating of the *Literature* it will be sufficient to name the principal authors on each style, with a short notice of the time in which they wrote, and the nature of their subject. It will be well also to note the authors who have contributed to the *revival of Mediæval art,* and its progress during the present century.

In *all cases* there should be a short enumeration of the principal buildings in each style, and if there be time a notice of their founders or architects; but essentially a biographical notice (if any memoirs have been preserved) of one or two leading Architects of the period or periods selected.

In the *Greek* style, careful notice should be taken of the temples, choragic monuments, and other buildings, in Asia Minor and Magna Græcia, as well as in Greece and the Islands.

If *Roman Architecture* be the subject selected, there should be an account of the origin and progress of the arcade, and more particularly of the system of building story over story, as in the case of the theatre of Marcellus and the Colosseum. The circular and octagonal temples, the triumphal arches, should also be noticed, as well as the temples of decidedly Greek form, and the character and arrangements of the public and private buildings found at Pompeii, &c.

If the *later period* of the *Roman Emperors* be that selected, the basilicas built or adapted by the early Christians, should be carefully treated of, with their several parts, and the variations from the ancient types.

In treating of the *Romanesque* and *Norman,* the buildings exhibiting the transition from the plainer to the more elaborate forms, the structures supposed to be *Carlovingian* and *Saxon,* and those of the time of Henry II, should be noticed.

The examples of the *Early English* period should include the military as well as the ecclesiastical edifices.

If the *Decorated* period be selected, a similar course should be adopted, with the addition of domestic architecture.

The *Perpendicular* style should be treated in the same way, tracing the changes down to the corrupt or *debased* period, and showing the abandonment of fortification in dwellings.

Some Candidates having desired to shew their knowledge of the *foreign styles* of *Mediæval* architecture, the same remarks as well as the following will apply. The best specimens of the *rayonnant* and *flamboyant* styles should be fully described; as well as those of the period before the great change when the Gothic styles passed into those of *François I*, &c., particularly as exhibited in France, the Low Countries, and Germany. In *Italian Gothic* the Lombardic should be noticed and its transition to the first pointed, and thence to the more decorated styles, especially such buildings as the Ducal Palace, and the Frari at Venice, the Palazzi of the Signoria with the Broletti of the Northern towns, the Duomo of Milan, that at Florence, and the Or San Michele at the same city, and as many more as time will permit of.

With regard to the style generally called *Elizabethan*, examples should be chosen showing the gradual introduction of Classic details, at the time when part of the work bears a Gothic stamp; those in which the last of the Gothic details gradually disappeared should likewise be mentioned: and, if the candidate is acquainted with similar continental works, it would be well to notice such buildings as the Church of St. Eustache at Paris, and the chateaux of the period, and any examples he may know in Italy, as the Certosa of Pavia, &c.

A notice of *Revived classic architecture* should include a comparison of the buildings in the three periods, that of Bramante, Michael Angelo, and Raffaelle; that of Palladio, Vignola, and Scamozzi; and that of Borromini and his followers: reference should also be had to the works of Inigo Jones, Sir Christopher Wren, or any other architects of this country; and to the form which *Revived Classic Architecture* has assumed during the last hundred years in France and Germany, with especial reference to bridges, statues, sepulchral memorials, and fountains; the management and construction of roofs, &c.

Besides such extracts from classic authors as will serve to test the general knowledge of a candidate in the next Examination for the class of Distinction, passages will be given from Pausanias, *Atticà*, and from Pliny, *Hist. Nat.* xxxvi., with nomenclature from Vitruvius, *Archit.* iij. and iv.

A DISCUSSION

Upon the Paper read at the previous Ordinary General Meeting of the Royal Institute of British Architects, by W. Tite, M.P., F.R.S., Past-President,

ON THE PARIS STREET IMPROVEMENTS, AND THEIR COST,

And upon The Several Proposed Schemes for Railways in London, and as to whether the Institute should take any and what Steps to induce Parliament to lay down a Broad, General, Ample, and thoroughly Efficient System of Communication between various parts of the Metropolis, and make the several projected Schemes subservient to and combine therewith,

At the Ordinary General Meeting of the Royal Institute of British Architects, January 4th, 1864,

Thomas L. Donaldson, President, in the Chair,

WAS OPENED BY

Mr. **Frederick Marrable**, Fellow, who, adverting to the plan prepared by him in 1859 for a comprehensive scheme for the improvement of the streets and thoroughfares of London, to which allusion was made at the last meeting, said, having found a copy of that plan amongst his papers, he had great pleasure in presenting it to the Institute. The portions coloured blue upon it represented the improvements that had been carried out by the Metropolitan Board of Works, or were still in progress; the portions coloured red were works projected. He thought, therefore, that plan might be of some assistance to any committee of members of the Institute which might hereafter be appointed to devise a general scheme of Metropolitan improvement. The estimates for all those works he had not thought it desirable to bring forward on this occasion, because they must necessarily be very crude, and it was doubtful whether they would be realised; because if these schemes were not carried out within a reasonable time, the value of property altered so much, that an estimate made in 1859, would be no criterion for improvements carried out in the year 1870. The other little publication (Mr. Marrable added) was presented to him on Friday last, when he accompanied the members of the Metropolitan Board and others on the occasion of the opening of the new Southwark Street and subway. He had presented that pamphlet to the Institute because it gave the estimated cost of that street in 1857, and the actual expenditure upon it up to December, 1863. The estimated cost for the purchase of property and goodwills of premises in 1857 was £464,137. The actual cost of the same as now completed was £480,012, not a very great discrepancy. He had put down 10 per cent. to cover contingencies, professional, law, and other charges, £46,412. He was happy to say with reference to the remarks made at the last meeting as to the exorbitant charges of professional men in such cases that the contingent expenses, instead of being 10 per cent. were little more than 5 per cent. the actual amount being £27,936. instead of £46,412. There was an extra cost upon this street of £40,228. beyond the estimate of £8,875. for paving and sewer only, caused by the formation of a subway not originally contemplated, and also the building of vaults to the houses. It was originally intended that the lessees, as they took the plots of building ground, should build their own vaults; but it was found better, in connection with the subway, to build the vaults for them. The repayments in this respect would amount to £10,572. off the £40,228., so that the actual cost of the subway,—which was a most important improvement in all new streets, and old ones as well,—was only £29,656. for a length of 3,450 feet. There was another curious item in these figures. He had estimated the return from the sale of old materials, at £9,283.,—the actual sum realised was £9,982. [The President asked how much the subway had cost per foot run.] **Mr. Marrable** replied that he had not carried out that calculation; he only had the total figures, but he believed it was a little over £8. 10s. per foot run. The value of property re-sold already amounted to £69,917., and the diminution in the actual cost, as compared with the estimated cost, was £30,651., so that they were not always to be accused of being greatly in excess of the estimates. [The President inquired what was likely to be the actual cost of that improvement, including the subway.] Mr. Marrable replied £290,000. That, however, depended partly upon estimate, because the property was not all re-sold. He had arrived at the gross cost, but he had not got the actual returns; but they could judge pretty nearly what they would be, as a good deal of the property had been re-sold. He might say in round numbers the actual cost of the street would be £290,000.

THE PRESIDENT, Mr. T. L. DONALDSON, said, he would take this opportunity to say a few words on the subject of Metropolitan Thoroughfare Improvements. Inasmuch as serious obstructions constantly occurred, it was a matter of absolute necessity that such improvements should be carried out at once, unless they wished to come to a dead lock in all their social and mercantile traffic operations; and the question of the traffic of the City more particularly must be taken up now, or he knew not when the evil could be remedied. Members would recollect Mr. Tite, in reading his paper drawn up with so much care, did not touch so much upon the works carried out in Paris, as to their necessity or the advantages derived from them, as upon their mere cost. That was the extent of the paper, showing how much money had been laid out in these large public improvements. It had, therefore, occurred to him, that it was desirable to bring before the Institute a few facts, as to what had been done in this way at Paris. Although the Metropolitan Board of Works were alarmed at Mr. Marrable's estimate of £19,000,000! it was proper they should know the results of the large outlay in the adjoining capital. He had procured from the Hotel de Ville some details of their works. The operations contemplated of boulevards, streets, avenues, and other lines of thoroughfare, represented a total length of 22½ miles! of these there had been executed already 17 miles. The width of the streets varied from 40 to 60 ft., and of the boulevards and other larger avenues of communication from 65 ft. 8 to 111 ft. 7. The Rue de Rivoli was the first work in continuation of the plan designed by the Emperor Napoleon I. He should state, that amongst various conditions to be answered by these works, one of the considerations was strategical in a military point of view, giving ready means of communication between all parts of the city in case of insurrection, so that the military might not be impeded in their operations against a mob. This had somewhat influenced, no doubt, some of the operations recently carried on in Paris—not that they had been executed for that sole purpose, but was one amongst other motives, at all events. This, however, would not form any consideration in dealing with the subject as regards London itself. In laying out cities, or even in improving them, there were three leading principles to direct the operations—convenience, health and beauty. In connection with our own Metropolis, the first essential condition, admitted by all, was convenience; the next was the sanitary condition of the city, because, in many places, London was positively unhealthy from the conglomeration of houses, without direct thoroughfares leading into each other, so as to produce drafts and currents of air; and, therefore, the sanitary condition of the atmosphere was inferior to what it would be, if there were straight lines of streets in those localities. At the west-end of London that was corrected by the squares, which served as the lungs of that part of London, and where the circulation of air was perfect and large. Then there was the third condition—which ought not to be lost sight of by the authorities directing these works—and that was beauty of effect, for to all but the rudest and vulgarest mind, it was necessary that there should be not only utility but enjoyment in inhabiting a city—something to please the eye and the fancy, making it a pleasure as well as a convenience to walk through the streets. Those were the general conditions, which should guide improvements and laying out of streets, and these had been very much attended to in Paris. It was not sufficient to have streets running merely from east to west, or from north to south, but in the case of Paris the Emperor had proposed diagonal lines of streets, and by that means the traffic of passengers and vehicles arrived rapidly at the point desired. This grand conception he believed was entirely due to the Emperor himself, who, he was informed, defined the lines of the streets with his own hand. He had seen the rough plan which his Majesty had himself traced out for the whole of the works at the Bois de Boulogne. The plan so sketched was then placed in the hands of proper persons to draw out the details and technicalities; but the grand conception was due to the Emperor alone. The plan of Paris exhibited on the wall had all the new "percements and allignements" marked in colour: those already completed in purple, those contemplated in pink.

General Table of some of the new principal Thoroughfares in Paris:—

Names of Thoroughfares.	Lengths.						Widths.		
	Metres.		English feet.		Parts of a Mile.		Metres.		English feet.
Rue de Rivoli	2,200	=	7,233	=	1½		22	=	72
Boulevart de Sebastopol	900	=	2,955	=	½	}2½	30	=	98·6
Do. do. continuation from Bt. S. Denis to l'Avenue de l'Observatoire	3,400	=	11,162	=	2		30	=	98·6
Boulevart de Malesherbes	1,700	=	5,582	=	1		34	=	111·7
Do. do. continuation and opening into the newly annexed zone of Paris	1,400	=	4,597	=	⅞		30	=	98·6
Boulevart du Prince Eugène	3,300	=	10,834	=	2		30	=	98·6
Boulevart de Beaujon	2,200	=	7,224	=	1⅜		30	=	98·6
Boulevart S. Germain	1,100	=	3,612	= nearly	¾		30	=	98·6
Rue La Fayette	900	=	2,955	=	½		20	=	65·8
Rue de Puebla, newly projectod	1,400	=	4.597	=	⅞		20	—	65·8
Rue d'isolement of the New Square Buttes St. Chaumont	1,800	=	5,910	=	1⅛		20	=	65·8
Total					12½ Miles				

The Rue de Rivoli is 2,200 metres in length, and 22 in width, or 7,223 English feet, equal to 1½ mile, and the width 72 feet. This is found to be an insufficient width in laying out a street of such importance and large traffic: it was begun under Napoleon First, before the full importance of the subject had been matured, and when only very imperfect notions were entertained upon the matter, and its continuation necessarily limited to the original dimension. The Boulevart de Strasbourg, under Napoleon III, was 900 metres in length, and 30 metres wide: in English measurement 2,955 feet, or half a mile, and 98 feet 6 wide. That noble dimension was not of too great a breadth, for those, who had seen the number of vehicles of all kinds going through this leading thoroughfare, must have been sensible that it was not more than sufficient—and the foot-pavement necessarily occupied a great portion of that space. Then they came to the Boulevart de Sebastopol, in continuation of that of Strasbourg, from the Boulevart St. Denis to the avenue of the Observatory. The length of that was two miles, in addition to the half mile of the former, and from one end to the other was 2½ miles in length, and 98 ft. 6 in width. There was a bridge about 100 yards more to the west, which was out of the straight line. We in England should have taken the street down to the bridge, and carried on the street at an angle; but in this case, in Paris, they took down the bridge and rebuilt it 100 yards more to the east, so as to preserve the straight course of the boulevard. Then they came to the Boulevart de Malesherbes a very magnificent one, 5,582 feet, or one mile in length, and 111 feet in width; in addition to which there was partly opened in the zone lately annexed, outside the ancient limits of Paris, a further extent of 4,597 feet, 98 feet 6 in width, at the commencement of which ample space was left for the building of the Grand Opera House, which was to cost a million of money. Churches were erected on these grand lines, and every section of the city would have a large church—we, from their size and importance, should call them cathedrals—their average cost might be taken at about £150,000. each. This showed the vast extent of the operations going on in Paris. Then again they came to the Boulevart du Prince Eugène, 1¼ mile in length, and 98 feet 6 in width. He was there in November, 1862, and again within the last few days, and he was astonished to find that, where previously he had seen the mere lines of the thoroughfare traced, now lines of houses were erected, 5 and 6 stories high. Another remarkable circumstance was a rich triumphal arch, larger than any previously erected, and the perfect model of which the Emperor had had set up, with all its embellishments, to the full height: at the period of his last visit all the modelling was swept away, and the permanent works of the arch were about to be commenced. Then they came to the Boulevart de Beaujon, 1¾ mile in length, and the same width as the others; then the Boulevart St. Germain, three-quarters of a mile in length, which was a portion of the contemplated improvements to be effected in connexion with the other side of the Seine, by means of a circular boulevard, to provide easy communication round that part of the city. Then they came to the Rue de Lafayette, half a mile in length, and 65 feet 8 in width; and also the Rue de Puebla, one of the projected streets in the annexed zone, which was seven-eights of a mile long; and lastly, to the streets of insulation of the new square of the Buttes S. Chaumont, 1⅛th mile in length, and also 65 feet 8 in width, the square itself being commenced, and to have a superficial area of 55 acres. This was a small portion only of these works, but it gave them some idea of the vastness of the operations carried on at Paris, and which would result in magnificent avenues, bordered with houses and trees where the eye could hardly reach from one end to the other. The mode of carrying on these operations was this:—The municipal administration of the city, under the Prefect, prepared plans, carrying out the ideas suggested by the Emperor, and when decided upon, the projects were submitted to the Council of State, and it was sufficient for them to declare, that the works were for the public good, and that was sanction enough for them to be carried out. There was a law by which they then went through other necessary steps. They gave proper notices to the parties of the intention to buy up the property, and they had heard already from his friend, Mr. Ashpitel, the mode in which the arrangements with the parties interested were completed. Having purchased the property, the houses were sold for demolition, and many persons had realised large fortunes by such operations, and the land was handed over to the municipal engineers, who defined and marked out the lines defining the width of the street, the roadways and pathways respectively. The Municipal authorities constructed the sewers, roadways, carriage and foot pavements. Hitherto they had not built any areas under the pavement. The roadways having been duly prepared, a regulation was made that the houses should be built of a certain height, the lines of the principal cornices and stringers being definitively fixed according to certain data. If a party took a good length of ground he might possibly be allowed not to make his houses either so high or so low as the others. But it was a remarkable fact, that so valuable was ground at Paris, and consequently so necessary was it to realise large rentals to cover the ground rent, that the houses of Paris consisted for the most part of houses with six or seven stories, each one very low, and a good suite of rooms, commanding a rent of one to more hundreds a-year, would not be more than eight or nine feet in height. The studio of a photographer in the Boulevart Montmartre, at quite the upper part of the house, realised a rent of £500. a-year, merely for a suite of rooms on the roof of the house. With houses of six stories, they must imagine the immense profits appertaining to house property in Paris. When the houses were erected, the freehold was sold to the parties, who paid a certain amount down, and were under engagement to pay the remainder within two years, and also the cost of forming the road and pathway. Within that period they must likewise have covered the property, or else it was forfeited. The great purpose of the authorities was to get the several works finished off, and the whole improvements carried out as rapidly as possible. They would see by looking at the lines on the map before them, the great facilities there were for getting from one part of the city to another—a most important point in a commercial point of view. If the conveyance of merchandise occupied four hours instead of two, they might imagine how much more it would add to the original cost of an article: therefore the quickness with which goods could be transported from place to place was not a matter to be disregarded. In their own individual experience, when they allowed a quarter of an hour more time to get through the city to reach a particular railway train, and it took half-an-hour, and then not reach the train in time, they could appreciate the loss, which arose from the want of a proper circulation of the traffic in our thoroughfares. To effect that had been one great purpose of all these operations in Paris, and they knew within a little what the cost had been, and he had told them the extent of many of these operations. His friend, Mr. Edward Hall, would be able to give them a more detailed account of this subject. He (the President) had contented himself with giving a general view of the operations in that city.

With respect to London, they must recollect in any future operations, what were at this time the principal accesses to the town, because all depended upon this as a starting point, viz., the traffic coming into a place and issuing out of it, and those were the main conditions to be regarded. Formerly the principal accesses on the left side of the Thames were from the East by Whitechapel; from the North by Islington; and from the West by Edgware Road, Oxford Street and Piccadilly: but all this was now changed, inasmuch as the main accesses to London were effected by means of the various railways having their termini in different positions. That, which was before essential as an access, was now used for secondary purposes, and now was the time to form other arterial lines of access and approaches to and from these great termini of the railroads. But the question was, should it be left to the railway companies, or to private individuals or associations, to carry out these great and necessary operations? What interest had they in the convenience or beauty of the city? For their own gain they would carry people and goods from one part of London to another; but that was not a matter affecting the public interest in the question of the general improvement of the main thoroughfares: therefore it was for the governing body to devise a proper scheme, and carry it out in the first instance. They had all seen the plan which had lately been published by Mr. Wyld, showing the various railway schemes projected in the metropolis, and instead of being a habitable city, there would be railways in all directions, to the great annoyance of all society. In Paris an excellent system of communication existed from one railway station to another, which was another point very much in favour of the interests of the public. He therefore thought, in many of these matters, they in London would do well to take what had been done in Paris as the basis of their operations—especially with regard to the termini of the railroads, and not only unite them by means of direct and convenient thoroughfares, but above all, to give them a ready access to the river. They did not want the lines from east to west so much as those from north to south, to relieve those running from east to west; because at present the thoroughfares were so insufficient from north to south, that the traffic was necessarily driven into the lines of communication from east to west. Look at the present route from the Great Eastern station in Bishopsgate to the West-end. It was through narrow streets, encumbered with an enormous traffic from morning till night. There ought to be a straight line from the Shoreditch Station to Waterloo Bridge, cut right through in a direct line; and they should have other lines from the other railways, as the Great Northern and North Western, in the same way: and these, intersecting each other, would become the main lines of communication. How should they get from Kensington to the Victoria Station? It should be by the Cromwell Road, 100 feet wide, which should be continued in a direct line, and take them down to Victoria Street. There was every reason why they should have diagonal lines of streets, commencing from the western end of Oxford Street to Charing Cross direct, and by such means they would establish great arterial lines of communication, which would be of the greatest utility: the same system should be carried out on the other side of the river. He therefore felt it was their duty to call upon Parliament to suspend these various railway projects, which would only serve special interests, till the whole system of thoroughfares of the metropolis had been investigated by a committee of the legislature, and some plan for the general public good devised. Therefore he begged to propose a resolution as the basis of the discussion this evening, as was done in the case of the Exhibition building of 1862, namely,—"That it be referred to a committee to draw up a petition to Parliament and to the Government, suggesting that a committee should be appointed to examine the general subject of street communication and embodying various recommendations; the said draft of petition to be submitted to an early meeting of the members." He merely submitted this resolution for the purpose of opening the subject. Other gentlemen present were capable of dealing with it better than he had been able to do, and he hoped the Institute would have the benefit of their advice on so important a matter as that, which was now under their consideration.

Mr. **Edward Hall**, F.S.A., Visitor, said he was afraid he was not at the moment prepared as he could have wished to be, in order to do credit to the Institute, and to the information which really he had been able to collect on this subject. The paper read by Mr. Tite at the last meeting, seemed to him to involve some inaccuracies, resulting from the incompleteness of the statement laid before them: that was to say, the mere figures of accounts, though not inaccurate in themselves, became to some extent so, from not including all the items which should be taken into the calculation.

The **President** said it was quite understood that the Government itself, independently of the Municipal authorities, contributed one-third, or one-half, and sometimes even more, towards these public works in Paris.

Mr. **Hall** observed that that was not the point he was adverting to; but he said he had been favoured with a copy of the "Mémoire," dated 1858, of the Prefect of the Seine, to the Municipal Council of Paris, which gave the exact sums then to be contributed by the Government in aid of the great division, actually in progress, of the general works, as well as the total sums estimated as to be expended.

The **President** remarked that the first operations began in 1849.

Mr. **Hall** assented. He had brought with him a plan, which had been kindly posted, expressly for him, up to the date of 1861, by Monsieur Deschamps, the head of the Bureau of the Hôtel de Ville, charged with the "Service du Plan de Paris," and had been also gone over by himself. This plan showed, first, the works of street-improvement as completed since 1848; second, the further works which had received sanction of the Imperial decree, up to 1861, and many of them now completed; and third, works projected, but which in 1861 had not been decreed. Mr. Hall went on to say, that what he wished to notice in the first instance, was the argument which Mr. Tite offered to them, or rather the conclusion which seemed drawn from the statements and figures, namely, that if New Cannon Street had cost a certain sum, and if a *deficit* at the time was involved in its formation, such street ought not to have been made. That was the conclusion propounded by Mr. Tite, or there was nothing at all in the argument. He (Mr. Hall) had paid much attention to the subject of the improvements of London, and having been resident in Paris from 1860 to 1862, he had been able to see that a great deal of information might be derived from what was in operation there. The Boulevard de Malesherbes was one of the lines referred to as having cost a very considerable sum, and as resulting in a loss. The result, however, should not be altogether judged of by a comparison of cost with length of the line from the Madeleine to the nearest corner of the Parc de Monceaux,—under a mile,—or not much more than a mile from the Opera. [The President, 1700 mètres.] It was true, as stated by Mr. Tite, that the amount of cutting in earthwork, was very large indeed; in some parts being about thirty feet in depth. The peculiarity of all the improvements in Paris was the production of straight lines, not only on plan, but in section or gradient. They did not take the varying gradient rising a hill; but they cut through the obstruction. Notwithstanding the enormous expenditure upon that work from the Madeleine to the corner of the Parc de Monceaux, he ventured to say, if it was not justifiable, it was not inexcusable. Previous to the recent formation of the Boulevard de Malesherbes,—originally an idea of, and even commenced under Napoleon I,—the whole of the district immediately beyond the park was a desert spot. At the time he (Mr. Hall) went to Paris, that district was unoccupied by houses; and other districts beside it, for want of means of access, had been scarcely utilized, as now they might, and were beginning to be. They must not only take into consideration the waste area immediately beyond the park, but also all parts beyond the fortifications, including Clichy, Courcelles, and Neuilly, and even Asnières across the Seine, and Courbevoie, to which last it was probable a bridge would shortly be formed. During the time of the first Napoleon, it was intended to form a port for ships at this point; and that project had been revived in the scheme of a ship-canal from Dieppe. It was obvious there were facilities there for a considerable port; but whether that were carried out or not, the whole of this area on the north-west side of Paris would be capable of being appropriated for dwellings. The characteristic of Paris, as of all other cities, was the too close crowding of the working classes in the centre of the capital. The only way to provide an outlet for them, was to form direct routes from central districts to suburbs. Such outlet was provided by the Boulevard de Malesherbes, by which also the Parc de Monceaux was utilised and rendered a pleasant place of resort. He therefore contended that the return from cost of that boulevard was not to be calculated on this short length alone, but the cost should be considered as that of a means of access to far distant quarters of the suburbs. The same might be argued with respect to the Boulevard du Prince Eugène and the Rue Lafayette, and generally to the main routes recently formed. He believed the joining together and equalisation of the quarters of a city was of very great importance to the social amelioration of the people, in the same way that the opening of roads in the country, and ocean steamers, were agents of civilisation. There was one great peculiarity, which the President had slightly alluded to,—in the system of the Municipality of Paris, carried into effect in their street-arrangements. If any large building, such as an *hospice*, even the corner of it, formed an obstruction in the desired line of street, it was removed and placed elsewhere. What should we do in a similar case? Supposing they made a route form Charing Cross to Islington, which was much wanted, and supposing that line was intersected by Coldbath Fields Prison, we should carry the line round the angle; but the French would not often be satisfied with even cutting off the corner; they would remove the entire building for the sake of preserving the straight line. That might seem an exceedingly expensive way of going to work, but he contended it was advantageous. These *hospices*, some of them gigantic establishments, and together filling great areas of ground, had fulfilled their office in the centre of the metropolis; and it was most desirable that they should be removed to suburban localities, and the ground on which they stood be devoted to workmen's dwellings. In addition to what the President had stated on this subject, he would say there were not only these routes laid out in direct lines from the centre to the outskirts, and similar direct lines forming the best means of communication from one railway station to another, but there was an excellently designed girdle-railroad, the Chemin de Fer de Ceinture; (at least, the southern portion, if not open now, would shortly be so); and they had nothing corresponding to that in London.

The PRESIDENT said the North London Railway, connected with the other lines, was the nearest to it.

Mr. HALL added that the question they had to consider in drawing a comparison between Paris and

London, was, not so much what was the comparative position now, as to matters of mortality and water-supply, which Mr. Tite alluded to, not only on the last occasion, but in his address as President of the Institute, in 1861, but what would be the comparative position of the two capitals in ten years hence? He (Mr. Hall) accepted a great responsibility in appearing before them; and he was afraid he should not do justice to the argument as to the advantages to be derived by London, from the experiences of Paris. But there was a good deal to be said as to the progress which the Municipality of Paris had at present made in those points on which we took considerable credit to ourselves, more especially in matters sanitary. He believed, in a short time, the water-supply of Paris would be vastly superior to that of London. Mr. Tite, in one of his addresses, had stated that he thought the quality of the water in London could not be greatly improved. He (Mr. Hall) did not complain very much of the quality, but that the quantity was insufficient. In many parts of London, there was no water to be had on Sundays. It was true, the water-supply of Paris was very defective at present. It was, for example, inferior to ours, in that the service was not carried to the upper floors of the houses. Generally speaking, the pipes were not carried to the tops of the houses communicating with cisterns placed there; but that defect would shortly be remedied. These were matters for which they must give credit to the French. Mr. Hall having explained, by a plan, the course of the intended aqueducts, and that portion of one of them actually in course of execution (the water being to be brought from a distance, in direct line from Paris, of fifty or sixty miles) proceeded to refer to the comparative mortality of the two capitals. Mr. Tite's argument, in his address in 1861, which he (Mr. Hall) read whilst living in Paris, was that as long as the rate of mortality was so high in Paris, they could not attach much credit to what had been done there. It might surprise many persons to hear that in 1860, the mortality was very little above that of London, being only something like a quarter of one in a thousand above. Not only was the general mortality in Paris so little in excess, but the mortality among young children was actually greater in London. And it was a still more important fact, that, since the commencement of these improvements, the mortality had been diminished. It was stated, in the beginning of 1863, by M. Devinck, that shortly previous to the improvements, the mortality ranged as high as 1 in 36; and that at the time at which he spoke, it was reduced to 1 in 40, or only 25 per thousand of the living, which is little more than that of London. If this were the result of the improvements, and the opening up of wide streets and thoroughfares, he (Mr. Hall) argued that that was a great fact to be considered, and taken into calculation, and particularly so by people who estimated sanitary works as having a money-value, which was in addition to that pecuniary saving which the President had so ably shown was to be derived from shortening the distances as between one point of a city and another.

Rev. RICHARD BURGESS, B.D., Hon. Fellow, said they had been shown most convincingly by the statements made this evening that our metropolis was in a very inferior state, as to its streets and thoroughfares, compared with what had been done in Paris; and the question now to be considered was whether anything could be done to bring the metropolis into a liveable state? If they went on as had been the case lately, he did not see how any one could live in it. If they looked at Mr. Wild's map, they saw a labyrinth of red lines in every direction, and if half of them were carried out, it would no longer be a city to live in. The only point he had to press was, that this Institute was the very body that ought to take up this question. To whom could people look for advice in matters of this sort if they were not to look to this Institute, which comprised, he might say, all the architectural talent, and a great deal of the engineering talent, this country possessed. He was sure, any thing emanating from this Institute must have great influence with Parliament. The President had shewn them that if they wanted to go from one part of London to another, they must work their way through narrow tortuous streets, incurring a great loss of time in going from one place to another. The difficulties in this country were, doubtless, much greater than in Paris. They had not an Emperor to sketch out a plan and give it to his officers to carry out at once. Members of Parliament refused to make grants from the public funds towards the improvements of the metropolis; but, notwithstanding, he thought when the matter was fairly brought before the Legislature, something would be done, and a plan devised for giving us those great thoroughfares which had been suggested, and which had become necessary for carrying on the traffic of this great city. All that would be required of the Government was to obtain power from the Legislature to make direct communications from one part of the metropolis to another, according to a general plan; and such powers being obtained, the works might be given to what the French call "adjudication;" and he believed that among our speculating gentlemen, who want good interest for their capital, there would be found many to compete for the works, and, except where the nation evidently derived some advantage, would ask for no grant at all from Parliament, the remodelling of the streets with railways underground would reimburse and benefit the company which might gain the adjudication. But be that as it may, he conceived the time had arrived for saving the metropolis from becoming a mere labyrinth of railway cuttings and viaducts, and bridges to pass from one side to another. This was a question also which affected the sanitary condition of the metropolis, and as to any street magnificence, or any architectural beauty, these seemed to be not even considered. He hoped the resolution proposed this evening would be carried unanimously; that a committee would be appointed, and that the whole matter would be taken up; so that the whole of London should be brought under the control of a Royal Commission by the Government and the Legislature, and he could not but think some great good would come out of it. He thought this Institute should show itself as the proper body to suggest improvements. He hoped the resolution would be carried out, and he did not despair of a great result arising out of it.

The **PRESIDENT** having, at the request of Mr. J. W. **PAPWORTH**, Fellow, again read the resolution, the latter gentleman said, while heartily agreeing with most that had been said on this subject, it seemed to him the better action would be to take a step beyond what was proposed in the resolution just read, by empowering the Committee to receive the suggestions of various individuals, and from those to select such as in the opinion of the Committee might be put into Classes 1, 2 and 3, and to submit them at once to the Government or the House of Commons in support of the grounds on which the Petition or Memorial was based. All were agreed that new streets and lines of communication were wanted in London, and this Institute was undoubtedly the proper body to offer practical suggestions on that subject. He hoped that the Committee would sit to receive such information, as it would probably save a whole session of Parliament, because committees of the House would have to settle immediately the question of these metropolitan railways, and otherwise all this Institute could do would be to say, when all the evil was done, "We tried to prevent anything being carried out with regard to these railways until the general question of metropolitan communications had been considered and determined upon, but that was all we did." He moved that the Committee should be directed to receive evidence as to desirable lines, and suggestions conveyed by plans.

Mr. C. F. **HAYWARD**, Hon. Sec., remarked that there was one point particularly in connection with the subject under consideration which had not yet been touched upon, he therefore ventured to say a word or two on it: but would remark first that the question of metropolitan communication was one which widened the more they looked at it, and comprehended more than at first sight appeared. The want of improved communication in London had arisen from the peculiar local government, or rather want of it, in the metropolis; while local vested interests had always interfered with any grand improvements. One of these private privileges was most extraordinary in the present age of public progress. It seemed almost incredible that in a great city like this, where direct communication from one part to another was such an acknowledged necessity, a series of private barriers should have been allowed to be placed upon the property of some noblemen and certain other large proprietors of building land, to interrupt the traffic through the streets and squares, which had been laid out apparently for public use, and which were maintained, partially at least, at the public expense. Through most of these obstructions, which had been erected within the recollection of everyone present, they could only pass by permission of the owner of the property, and awaiting the pleasure or convenience of the appointed guardian. This seemed to him a crying evil, and one which ought never to have been allowed at all. When they talked of the necessity of opening up a direct communication between the railway stations and other parts of the town, let them look at the position of one of the most important termini—that of the London and North Western Railway, originally only the London and Birmingham, but now a series of railways concentrated at Euston Square, to which might now be added the Metropolitan Station at the end of Gower Street. It seemed proposterous that the governing bodies of London should have permitted streets to be built in direct communication with this important point, and at the same time have allowed barriers to be placed in those streets, and so prevent the very improvement in the way of accommodation for the traffic for which streets were formed. How was it possible to get to Euston Square conveniently from the Strand except through these "No thoroughfares, except by leave?" The only real public communication from the south-west at present was by Tottenham Court Road, which on that account was the more often required to be stopped up for repairs. Gower Street would be a substantial relief to the Euston and Hampstead Road traffic if it were a thoroughfare, and if it had been so would probably have become by this time much less dreary than it now is, and far more valuable in a pecuniary point of view. Most of the other streets eastwards in that neighbourhood were passable only by permission, though he might observe that with regard to the other great line running from Holborn through Russell Square and past St. Pancras Church, and really a most important and one of the most direct lines in the metropolis, this permission was *not* given; while at the very entrance to the railway station, the direct route was barred by a triple row of iron gates, lest the sanctity of that dingy side of Euston Square should be disturbed. This St. Pancras gate was churlishly kept closed, and cabs made to turn back—even the other day, when all the rest of the streets were under repair, and when it was literally the only direct avenue by which the station could be reached. Looking at this state of things he begged to suggest whether some means could not be devised whereby such public nuisances might be got rid of.

The Rev. Mr. BURGESS observed that an Act of Parliament could knock them all down.

The PRESIDENT remarked that this was one of the points to be considered by the Committee and embodied in the Petition.

Mr. HAYWARD continued—This point was the more important, as it involved no expenditure of large sums of money in the purchase of property, or the making of new streets, but simply the doing away with the gates, which ought never to have been erected, and which ought at least to follow the abolition of the toll bars next July, which had long remained a standing disgrace to the management of London, and one which it had required years of agitation to remove. With regard to the straight lines of streets to which Mr. Hall had alluded, he could not agree that it was always desirable to have the line of communication exactly straight, though it ought certainly to be as direct as possible. Nothing was more monotonous than a mile or two of parallel walls, as was evident even in the new Parisian improvements. He did not think there was any advantage at all in these long vistas, and he preferred the system prevalent in this country of easy curves where necessary, only let them adopt those broad lines of communication, with here and there those noble areas, and squares, or "*places*," such as they saw in Paris, and which helped so greatly to make up the magnificence of that city. He entirely agreed with Mr. Hall in the economy of removing large masses of public buildings, such as the building mentioned, Coldbath Fields Prison, for example,—that stood in the way of any improvements. It would be a blessing to those establishments themselves to be removed, and it would be profitable to utilise the space for other purposes. Again, there had been great talk about the want of suitable localities for habitations for the poorer classes in the metropolis. That want, he submitted, was easy to be met. In certain portions of the east-end of London they found miles of streets and acres of land covered with miserable little two-storied dwellings, which hardly deserved the name,—not more miserable in the sense of being dirty and dilapidated, and in the want of proper sanitary arrangements, than miserable also as to their mere size, compared with the area occupied by them and the vast necessities of the case. There were acres of property in London which could accommodate ten-times the amount of the present population located upon them, and, in point of sanitary considerations, become a thousand-times better, by improved buildings being erected upon a proper and well considered plan, and on a sufficiently extended scale. This also was a point to which attention must be given in considering the question of public improvements in London. Some remark made by Mr. Hall as to the waste districts in Paris, now converted into something very different, would very much apply to what he (Mr. Hayward) had been describing. There were similar districts in London, where the same kind of improvements, or that especial one he had mentioned, could readily be carried out, and he might point to the spacious model lodging houses built by Miss Burdett Coutts in Spitalfields,—a district which could be made to accommodate, as he had observed, at least ten-times the number of the present population, with very great advantage to all parties concerned.

Professor **Kerr**, Fellow, said he was fully prepared to support the proposal of the President, and to second it as a motion if necessary. At the same time he agreed with Mr. Papworth that if it were understood that the proposed Committee had power to take evidence it might be an advantage. During the interval before the meeting of Parliament the Committee might then be enabled to reduce the idea before them, not perhaps to the form of a definite scheme of operations, but certainly to that of a well digested proposition to submit to the public and to Parliament. Another thing that occurred to him was that the Metropolitan Board of Works would probably have an influential voice in the question, which the Committee ought to bear in mind. As for the incomprehensible network of lines which represented the projected railways on the map before the meeting, it reminded him, as it would many others present, of the state of things at the period called the Railway Mania. At that time Parliament had been confessedly bewildered by the complexity of the situation. Line after line was sanctioned individually and at random; and then, when the mischief appeared, a loud outcry was made in Parliament itself because the railways of England had not been collectively dealt with. The present situation with regard to London was exactly the same as the former one with regard to England at large; and if Parliament had not the firmness and good sense to take up the question now as a whole, the same outcry would be raised again almost more seriously than before. A singularly good opportunity, therefore, had arisen for Parliament, the Board of Works, and all others interested in the improvement rather than the injury of the metropolis to deal with this important question carefully and cautiously, and the Institute would certainly do well to take its proper part for the public good.

Mr. **Edward Hall** wished to explain, with regard to the objection taken to long vistas, that he only defended the lines as allowing the readiest means of getting from one part of the capital to another. It was important and indispensable that they should be able to get in the shortest time from one locality to another; but as a point of art, he admitted and indeed contended that the monotony of very long lines should be corrected, as by circuses, and by bringing forward and setting back the buildings, and by all other arrangements conducive to variety.

Mr. JOHN P. SEDDON, Hon. Sec., said that in his opinion it was an extremely clumsy proceeding, to say the least of it, to carry a new street in a perfectly straight direction and perfectly level, ignoring all the irregularities of the natural site and the buildings which lay in its way. The consequence of such a course must result in the monotony which had been so justly complained of, and which was so painfully observable, according to his judgment, in Paris. There might have been a practical necessity for having done so in that city, but it was surely needless and to be avoided in London, where there was no occasion to provide for problematical artillery practice. It seemed to him that the best plan was that which common sense would appear to suggest, namely, of laying down a comprehensive scheme, with streets as straight as circumstances would permit, but taking advantage of and improving the accidental irregularities which would constantly occur, and making deviations and curves to avoid extant buildings of interest; and that such would not only be productive of greater picturesqueness and beauty than that which had been adopted in Paris, but fortunately was the only practicable plan in a country unblessed with a despotic government.

Mr. FREDERICK MARRABLE said, like most other great evils, this evil of the multiplicity of Metropolitan Railways would, he apprehended, cure itself. The great number of schemes before Parliament would compel the Government to deal with the matter as had been proposed in this room. He believed the engineers of the various projects were fully aware that there was little likelihood of these schemes being passed in the next session; but that Parliament would throw them all into one committee-room, and propose a Royal Commission, to deal with the question of metropolitan communication as a whole, in the way that was suggested by the learned President this evening. He believed in this respect this Institute might render some assistance. They knew, as regards the Railways at present projected, there were three or four conflicting schemes for effecting the same objects, designed by different engineers. It was a race between engineers which should be able to bring the best evidence before Parliament, and provide the largest amount of capital in bringing their plans before the Committee. He repeated he thought that was an evil which would effect its own cure: and he did not anticipate any serious difficulty in this matter in the ensuing session. With respect to metropolitan streets, he did not see why Government should not compel the demolition of the barriers on private properties alluded to by Mr. Hayward. The Duke of Bedford had consulted his own advantage in this respect rather than that of the public, and had fenced his property round and kept it to himself. He (Mr. Marrable) did not see any good in it. The Duke of Portland had done the same thing in some few instances, as also the Marquis of Westminster. Almost all these magnates had retained the power of excluding the public from their property when they thought fit, yet these were public streets, the paving and lighting of which were paid for by the parish in which they were situate. [The PRESIDENT said he thought not in the case of the Marquis of Westminster.] It was quite certain that the public good ought to be consulted rather than private interests, and all these barriers on private estates ought to be done away with, and the Rebeccaites, by legitimate agitation, might usefully employ themselves in the demolition of these gates. With regard to dealing with these matters in London in the same way as had been done in Paris, he did not think they had the capabilities for doing that. In the first place, they could not persuade the Government to grant large subsidies. The Government itself was comparatively powerless; Parliament managed these things, and country members would not grant money for metropolitan improvements exclusively: He questioned both the judgment and the policy of that, because the metropolis was open to all England, and provincial people made use of it in their turns. Then again London was called the capital of the world; more foreigners came to London than to any other city in the world, and therefore it should be a point of national pride that London should in all respects be equal to any other city. But they had much to contend with before they could hope to get the funds for these great improvements; but when the country members of Parliament declared that they would not aid those improvements out of the national purse, they should at least be just and not take money from the metropolitan purse and put it into the national exchequer. There were many causes which tended to burden the purse of the Londoner. The cabs and omnibuses tore up the pavement of the streets, and those vehicles paid a heavy Government duty, which went into the national purse. If the metropolis had the exclusive advantage of these duties from cabs and omnibuses, there would be no difficulty in carrying out all the improvements they required. Parliament had yielded rather grudgingly, and for a limited number of years, the coal duties for the purposes of the Thames Embankment. This would enable the Metropolitan Board of Works to carry out that work without any extra taxation of the rate-payers. The tax of 9d. per ton was one most easily collected, and was as just to the poor man who bought his coals by the cwt. as to the rich man who bought by tons: in either case the remission of that tax was not an appreciable matter, amounting as it did to only 30s. to the consumer of forty tons of coals per annum. That tax was to have ceased in 1862, but it was to be continued for another ten years, and he hoped when that was expired it would be renewed for another ten years, inasmuch as he regarded it as a necessary tax to provide funds for the improvement of the metropolis. If the Government only yielded for the same purposes the London cab and omnibus duties, they would have an additional fund of £300,000. which, judiciously expended, would go a long way in effecting the necessary metropolitan improvements. There were other local duties which might be yielded for the same purposes, which come directly out of the pockets of metropolitan indwellers, and might fairly be applied to their benefit, instead of being swept into the national purse. With regard to the removal of large public buildings which stand in the line of street improvements, the instance of such a building as Coldbath Fields Prison had been mentioned: but he would take the case of such a building as St. Thomas's Hospital, the trustees of which had a right to say, "If you touch us you shall take the whole of the property." There was an enormous expense attending that, out of which they could only get a very small return. If they had a large piece of vacant ground it was a long time before they could lay that out, and only such portion as gave frontages to the main thoroughfare would produce an adequate return, and in the end there was a heavy deficit. Therefore he thought it wiser, if a large public institution stood in the way, to lay out the line so as to avoid it. Long vistas of streets were to a certain extent good, but when carried to an unlimited extent he thought they were objectionable, and unless relieved by churches, or some other large buildings, there was nothing to rest the eye upon. In laying out such a street as Regent Street it might be varied by circuses, crescents, or squares, but to go on in a straight line, as they had done in many places in Paris, without anything to break the vista was, he thought, objectionable. He preferred a gentle curve of the line at some points—nothing was so wearying as travelling for a long distance on a perfectly straight road; they passed the mile-posts without variety, and there was nothing to break the monotony and tedium of the way. With regard to a general and comprehensive plan of metropolitan improvements, these must, in his opinion, be met as circumstances arose to lead to them. It might be well to have a general plan in view, but he doubted whether any such plan would ever be realized in the whole. Sir Christopher Wren laid down an admirable plan: how much of that had been carried out? Scarcely any, if any. There was extreme difficulty in an Institute like this laying down a plan which would be approved of by a governing body. They would always have their own say in the matter. At the same time, this Institute might render valuable assistance, and he would not throw cold water upon the proposition which had emanated from the President. It might be useful to have an expression of opinion from this Institute; at all events, it might have the effect of suspending a great many of the insane railway schemes now before the public.

The PRESIDENT said, with regard to Mr. Marrable's observation, what they had now to determine was the general principles, and not the details of the plan. They must endeavour to persuade Parliament not to allow the various railway plans to be presented till the legislature had agreed upon some general system of improved main arterial thoroughfares in London. If they were to submit any definite plan of their own, they would undoubtedly fail of their object, for great differences of opinion might reasonably arise on their scheme, and they might at once be met by objections to it. He agreed with Mr. Hayward that the barriers erected upon private properties were to be greatly deprecated. In his own case, living in Russell Square, which was subject to the conditions described, having to go by a circuitous route he had sometimes been almost too late for a train. Then he would say, with respect to straight lines of streets, travelling along high roads in the country to the extent of two or three leagues would be wearisome, but in speaking of streets, which must necessarily be of restricted length, they did not talk of leagues. Oxford Street and Piccadilly were grand lines. In the town of Lyons the Rue Impérial, which had within a few years been pierced through it, was broken with gardens and squares, and the whole had a most magnificent effect, and that, which was formerly a poor and rudely built city, had been rendered fit to be the capital of a great empire. He thought it desirable to have these straight lines of thoroughfares as much as possible relieved at intervals by squares, circuses, churches, and other public buildings, which would deprive it of monotony, for the great idea in all capital cities was to get as straight lines of communication as possible, varied with monuments of some kinds on either side. With respect to subsidies, he considered it a great point to be looked to, not merely for London alone, but for large provincial cities, to induce public improvements, as at Liverpool, Leeds, Birmingham, &c, for he thought the subsidies should be extended as far as possible all over the country, so as to induce general improvements even in small towns, and he believed the return would be equivalent to the outlay. The £300,000. per annum, spoken of by Mr. Marrable, would be a very small modicum towards carrying out the necessary improvements in London, and the amount annually expended must be much greater than that, and the work must be commenced at once. The difficulties were daily increasing, and unless they secured the existing vacant spaces they would soon be covered, the difficulties of carrying out any general scheme would be greatly enhanced, and it could then only be effected at the greatest cost and in the most extravagant way. He therefore hoped the Meeting would adopt the general view of the case which he had pointed out, leaving it to the Committee to make such suggestions as occurred to them, when they came to consider the question.

The PRESIDENT the put the resolution, which was agreed to unanimously.

The Meeting was then adjourned.

ON HYDRAULIC LIFTS.

By John Whichcord, F.S.A., Fellow.

Read at the Ordinary General Meeting of the Royal Institute of British Architects, January 18th, 1864.

The subject to which I have the honour to invite your attention this evening may, from its title, appear at first sight rather to concern the Civil Engineer than the Architect. But even were it so, I conceive it to be of the highest moment that we, who from our profession should be able constructionists as well as artists, should be as well acquainted with the laws relating to statics and dynamics as with the canons of taste; and that it is of the highest importance that we should keep ourselves informed as to every scientific discovery, as to every power that modern research may develop, and as to every convenient or ready adaptation of the same; more particularly those which may affect the soundness and economic construction of buildings, and the comfort and convenience of their inhabitants.

Hydraulic power, applied to edifices, is calculated to make a complete revolution in future building operations. One primary difficulty exists in London at present, namely, the deficiency and want of elevation of the public water supply; but it is in the anticipation that this will be amended before long, that I think it desirable to direct the attention of the Institute to the subject before us. Every one knows the enormous value which land has reached in this metropolis, and every one who reflects on the wholesale destruction threatened in all parts of it, must feel that day by day the space left near our great centres of business must become of much greater worth; and that we shall ultimately be compelled, as is the case in the fortified cities on the Continent, to seek that room upwards, which it is impossible otherwise to obtain. The objection to this course we all feel to be the labour, entailed on the occupiers of tall houses, of climbing wearily stair after stair till they reach their destination; but the evil does not rest here, for medical men report that peculiar diseases are induced in servants and others who constantly have many stairs to ascend, by the unnatural exercise of their limbs.

By the apparatus I shall venture to explain, this objection may be obviated, almost entirely, without any manual labour whatever. For instance, a whole family, with all their paraphernalia of luggage, enter a small room, which on simply opening a valve, ascends by that gigantic yet most manageable of all powers, hydraulics, slowly and safely, and lands them on any floor, however elevated, on a level with their own apartments. What the locomotive has been to the traveller, the hydraulic lift will be to the dweller in elevated stories; and it is not unlikely that a contrivance, so simple and yet so inexpensive in working (manual labour is unnecessary) will hereafter be found in every moderate sized private house.

The extraordinary notions which prevail as to the knowledge, or rather ignorance, of the ancients of everything relative to water power; the popular error that neither the Greeks nor the Romans knew that water confined in pipes would rise to its own level, and the general misconception on the subject, induce me to allude, very briefly, to the hydraulics of the ancients. To dispose of the first fallacy is easy. Not only in Herculaneum and in Pompeii have complete series of lead service pipes been discovered, for delivering water to fountains and cisterns exactly as in the present day, but they were found long before in Rome itself. It seems inconceivable to any classic reader, with such a story before him as the well-known one of Pyramus and Thisbe, that such a misconception should not have been dispelled. The poet, Ovid, likens the spurting of the blood from the wounded man to the jet of water issuing from a defective lead pipe. His words are (Met. iv, 68):

. . . "Cruor emicat altè;
Non aliter, qùam cùm vitiato fistula plumbo
Scinditur, et tenues stridente foramine longè
Ejaculatur aquas, atque ictibus aëra rumpit."

Well known as this passage is, grave scholars have contended that the ancients were ignorant of the first principles of hydraulics. We have also in Vitruvius one whole book (the 8th) dedicated to the subject of water and water works. In the seventh chapter he not only shows how water may be conveyed by constructed or "built-up" culverts, but by leaden pipes, and (what we conceive to be a modern invention) tubes of pottery He shows how to take the various levels necessary for the purpose by two instruments, the "dioptra" and "chorobates," and also how water may be made to descend into a valley, and ascend again, and how to fix, in the culvert, stand pipes, "columnaria," to allow the escape of any enclosed gases (spiritus). His tenth book treats of water wheels, the screw of Archimedes, and, more than that, the force pump of Ctesibius. The greater part of these matters have been explained at length in the Dictionary of the Architectural Publication Society under the various heads.

I will not dilate on this part of the subject, but I cannot refrain from dwelling a moment on the curious treatise by Hero of Alexandria on Pneumatics, brought to my notice by our fellow Mr. Ashpitel. Although it is entitled as I have stated, it contains several curious and valuable experiments on hydraulics. Among them is one showing "How to open the doors of a temple by fire on an altar," (a very lucrative trick probably for the use of the pagan priests). Pipes filled with water were conveyed through the body of the altar to the hollow on the top where the fire was made, and thence to a species of piston which acted on rollers, round which were cords connected with the doors, and concealed beneath the pavement. As soon as the offerings were made, and the fire kindled on the altar, the water of course expanded by the heat, and the doors of the temple opened slowly of themselves without a visible hand or the action of the wind, no doubt to the great awe of the votaries: this is actually a steam crane, and probably the oldest example of that machine.

In the middle ages the study of hydraulics seems to have been entirely neglected, and except occasionally for the supply of a conduit or a fountain, no attempt appears to have been made for the distribution of water. The houses in cities were scantily supplied by their water-bearers with "tankards" as late as the days of Ben Jonson. Soon after, however, the works of the New River were commenced, and hydraulics became a most important theoretical as well as practical study; and about the same period the curious work of Böeckler was published in Germany, and later that of Bélidor in France.

Cranes, lifts, or hoists, have been worked by means of many different agents or prime movers, and have been used for a great variety of purposes. Although many of these scarcely come within the scope of the present paper, yet, as the same principles may be applied to the working of all hoisting machinery, it is thought desirable to allude shortly to them.

The earliest form of machine was the winding barrel, or drum (the "tympanum" of Vitruvius) turned by hand, fixed either directly over the weight to be raised, as in the case of a well bucket, or with a rope passing over a fixed pulley; and to this simple form was added a swinging arm or jib, which allowed of the weight, when raised, being swung to a different position before being lowered down. For a long period manual power was the only force used, but in many occupations—for instance, in coal mining—it became necessary to adopt some cheaper and at the same time more powerful agent, and horse gins, whims, or whimseys, were constructed for the purpose, not only of raising minerals, but also water, by buckets, for the drainage of mines and quarries. In most cases the horse walked round in a circle, and turned a large drum or barrel, round which the rope or chain was coiled; but sometimes the animal was made to walk inside a large wheel, the surface of which moved from under him as he stepped forward, thus compelling him to hard labour of a very similar kind to that of prisoners on a treadwheel. The intelligent proceedings of the donkey raising water from the Old Well at Carisbrook Castle are doubtless familiar to all. The large wheel is erected in a house built over the well, and on its axle is fixed a pulley, over which passes a chain, to each end of which a bucket is attached, one being at the bottom of the well when the other is discharging its contents into the cistern at the surface. As soon as the donkey is brought from his stable, he deliberately steps in to the wheel and sets to work to draw up the bucket from the bottom, and as soon as he hears this emptying the water into the cistern he turns round and goes the other way, thus making the wheel revolve and draw up the empty bucket, which has just descended and which has now become filled: and so he proceeds until the cistern is full and begins to run over, when, of his own accord, he steps out of the wheel and walks back to his stable. Another familiar application of this power is the common horse run, for lifting barrows of earth in the formation of embankments, or materials to the top of a building in course of construction. In this instance the horse's strength is applied directly to the drawing of the load, there being no occasion for multiplying gear. There might be some cases in which it would be advantageous to work lifts by means of horses, where water or steam power was not available, but, as a general rule, neither this nor manual labor is of much service in the present state of mechanical knowledge.

Winding apparatus has also been worked by wind power, as in the common hoisting tackle in a windmill; but, from its uncertainty, this agent can never be employed to much useful purpose.

In the mines of Germany, so long ago as the beginning of the sixteenth century, water-wheels were employed for raising ore; these were either single wheels, or with a double row of buckets set in reverse order, which enabled the motion to be changed more expeditiously and with greater safety in lowering or raising the corves or buckets alternately. Such a double waterwheel was erected at Walker Colliery, near Newcastle, by Smeaton, in 1778, the drum round which the rope was wound being fixed directly on the water-wheel shaft. This form of power is still very extensively used in Wales and Cornwall, where water is plentiful and great falls are easily obtained. It is very seldom, however, that water applied in this way can be useful for the architect's purpose, except in warehouses attached to corn mills, or manufacturing premises situated on the banks of a river with a rapid current.

Another way of applying water power for lifting is exemplified in the water-balance machines, which are very extensively used in the Welsh and other iron works, both for raising coals and ore from the mines and also for discharging them at the mouth of the blast furnace. The apparatus consists simply of a large pulley or drum, standing directly over the pit's mouth, over which passes an endless chain or rope, to which are attached two buckets, or rather tanks, one on each side, on the top of which are placed the waggons to be raised or lowered. A brake wheel is attached to the drum or pulley, so that the workman may stop the machine at any moment, or check the speed of its ascent. The tank and waggon at the bottom being of the same weight as that at the top, and the chain being endless, the whole is in a state of equilibrium, and the motion is produced by filling the upper tank with water sufficient to overcome the weight of the loaded waggon, which, upon the brake being released, rises to the surface. The water is let out of the tank on reaching the bottom of the shaft, and, on the waggon at the top being unloaded, the whole is again in equilibrio and ready for the repetition of the process. This is a very cheap form of lift, where plenty of water is at command, and there is the means of free drainage at the bottom; but it is open to the objection of being dependent for safety upon the brakesman, as the velocity, unless checked, necessarily becomes accelerated at each foot of descent, in accordance with the law of falling bodies. Water-balance lifts have also been extensively used in the working of canals, on precisely the same principle as that just described, the only essential difference being that the barge takes the place of the waggon. It has been attempted to apply this principle to the class of lifts required in hotels and warehouses, but in consequence of it being necessary to have the power of stopping at different floors, and sometimes of changing the direction when half-way, the difficulty of managing the supply of water to the tanks, and the time lost in opening the different valves for regulating the exact quantity of water necessary for either ascent or descent, have put this form of lift quite out of the question. Another (but a very rude description of balance lift in use in some manufactories), consists simply of a chain or rope passing over a pulley, to one end of which is attached the cage containing the weight to be raised, and to the other a counterbalance weight sufficient not only to bring up the cage but also the heaviest weight that is ever to be placed upon it. The speed of ascent is regulated, as in the last instance, by a brake, and the safety of the whole is thus entirely dependent upon the skill and coolness of the men in charge. In order to bring the lift down again, it is of course necessary to obtain from some quarter a weight sufficient to overcome the counterbalance, and unless it should happen that sufficient goods are ready for lowering, this cannot be done without great waste of labour. The ascent and descent are also assisted by the man inside the cage pulling at the endless rope passing over the pulley at the top, which is keyed on to the same shaft as the balance drum or pulley; but the additional power thus gained is of little service where anything like 6 or 8 cwt. are required to be raised.

The introduction of steam effected a complete revolution in this as in all other branches of mechanical knowledge and practice; although it is a singular fact that very many years elapsed after the steam engine was used for draining mines before it was applied to the raising of ore, &c. from them. This was probably, however, the first branch of industry to which steam was employed for moving weights, always excepting the opening of the temple doors before referred to; but its use was soon extended to other trades. It is now applied in a great variety of ways: in cranes, whether fixed on a wharf or in a warehouse with swinging jibs, the steam is generally used through cylinders acting directly on cranks fixed to the winding gear of the crab or windlass, the force being thus applied exactly at the same point as in the case of hand cranes. Sometimes, however, the steam is made to act directly on a piston and rod, to the end of which the chain is attached, so that the pressure of steam raises the weight without the intervention of any gear-work whatever, and is thus analogous to the force exerted by the horse in the common horse run, before alluded to. Direct-acting cranes on this principle have been erected at Lowestoft for the discharging of colliers, and are found very efficient for a short lift. A modification of the same crane was constructed by Mr. Morrison, of Newcastle, for the same purpose, in which the wire rope itself was made to act as a flexible piston rod, being attached directly to the piston.

But besides the direct application of the steam engine to the crane just described, there are a number of methods of transmitting the force, either through shafting and gearing, or through the pressure of air or water produced by pumping. And this brings us to what is more directly the object of this paper, —the appliances hitherto alluded to being of greater use to the railway or dock engineer than to the architect, who has seldom to provide for the raising of weights exceeding 15 cwt. to 20 cwt. at one time.

The most common form of hoist is that known as the Manchester or Lancashire teagle, which can be applied to any part of a building where power can be obtained from a lay shaft used, it may be, in connection with the particular branch of manufacture—as, for instance, in a cotton mill. This machine consists of a winding drum or pulley, over which a rope or chain passes, to one end of which is attached the cage or room, and to the other a weight, which is generally made sufficient to counterbalance not only the weight of the cage but also half of the load, so that, whether the cage is ascending or descending, the power exerted by the apparatus is pretty nearly the same. The winding pulley is made to revolve by means of gearing driven by straps on the lay shaft before alluded to. This gearing consists of three riggers or driving pulleys, two of which are allowed to run loose on the shaft of the hauling drum, and the third is keyed on, so that, when either strap is on the third pulley, the machine is in motion. The action of the lift is reversed or stopped altogether by the attendant in the cage pulling a rope which acts upon a lever and throws either strap on to the fast pulley, or allows them both to run on the two loose pulleys, in which case, of course, the lift stops. The same movement which throws the straps on to the loose pulleys also puts on the brake, so that the lift is prevented from falling. Two ropes or chains, each sufficiently strong to sustain the utmost load, are generally fixed to these machines, and in cases where wood guides are used, a safety apparatus is sometimes adopted to prevent accident from the ropes breaking, the general principle of which is, that if the rope should break a serrated projection is thrown out by a spring to lay hold of the timber guides. As this would not prevent the falling of the cage in case the straps or gearing should give way, or the rope slip on the pulley through the cage being over-weighted, or any other accident to the machinery, a very ingenious invention was introduced by Messrs. Westhead and Barnes, and shown at the Great Exhibition of 1862, for throwing out the serrated projections not only when the rope breaks, but whenever, from any cause, the velocity of the hoist in its descent attains a limit beyond which it may be deemed safe to travel. It consists simply of a ball governor, similar to the common steam engine governor, fixed to the top of the cage, and put in motion by a friction roller constantly pressing against the guide upon which the hoist works. Should the hoist ever attain too great a speed, the governor immediately releases a latch and sets free the serrated cams. The greatest objection to these safety appliances is, that in an establishment where the people are not accustomed to machinery, such as a warehouse, an hotel, or a private house, the apparatus would in all probability be neglected, and through want of cleaning and oiling, or other cause, be out of order at the time when it would be most required. It is therefore generally preferred to provide for safety by having double ropes, and trusting to the attendant putting on the brake in case of accident. A great number of this description of hoist are at work in the cotton mills and warehouses in Manchester and elsewhere.

Another form of applying steam power is by a worm-wheel acting on the hauling drum without the intervention of straps; an instance of this method of driving is to be seen in the well known ascending room at the Colosseum, which was first fitted up by Mr. Easton so long ago as 1834, and was improved by Messrs. Easton and Amos some years afterwards.

Besides this description of hoist, cranes for unloading and loading goods, both on a wharf and in a warehouse, have been worked by means of a vacuum acting, instead of steam, in the cylinders of the crabs and cranes. The vacuum is produced by a steam engine and an air pump exhausting the air in a receiver, with which all the different crane cylinders are connected by means of pipes made perfectly air-tight. The cylinders are set in motion, exactly in the same way as in the steam engine, by opening and shutting valves. In fact, the engines are identically the same, the only difference being that the pistons are drawn, instead of being pushed from one end of the cylinder to the other. Cranes and hoists on this principle have been at work ever since 1846, at the premises of the South Eastern Railway at Whitstable.

Although the pressure and weight of water were used at a very early period for the purpose of raising weights in mining and other works, and the invention of Bramah's press drew general attention to the convenient application of its immense power, yet it does not seem to have occurred to any engineer to apply this principle, on an extended scale, until Mr. (now Sir W.) Armstrong, introduced his hydraulic cranes; the first of which was put up on Newcastle quay in the year 1846, and was worked by pressure from the street mains equivalent to a column of about 200 feet. The irregularity of pressure consequent upon the variable draught from the mains for house consumption greatly detracted from the usefulness of the crane; and Mr. Armstrong then invented his "Accumulator" as an artificial head or reservoir, to be used where sufficient and regular pressure could not be obtained from a natural supply without the aid of pumping power. The accumulator, so called from its accumulating and storing up the power of the pumping engine, consists of a large cast-iron cylinder, fitted with a plunger, which is loaded to the required pressure, and is connected by means of cast-iron pipes with any number of cranes or other machines. The cylinder is made sufficiently large to contain the greatest amount of water, which can be drawn from it by the simultaneous action of all the machines worked from it.

The principle of the crane itself is that of a plunger or ram, to the end of which is attached a pulley block, having two or more sheaves (used in the inverted order of blocks and pulleys), working in a cylinder, to the end of which is fixed a similar set of sheaves; the hauling chain is made fast to the cylinder itself, and passes over both sets of sheaves as many times as the total height to be raised exceeds the stroke of the ram, so that in the passage of the plunger from one end of the cylinder to the other, the cage or load attached to the chain is lifted the height required. The size of the plunger will, of course, depend upon the load to be lifted, and the amount of pressure available.

Sir W. Armstrong's system has been largely adopted in almost all the great docks and railway stations both in this country and abroad, and it is, without doubt, the very best for transmitting great power to a large number of different machines, fixed at various points over a wide area; and it has the advantage of being applicable in many places where it would be impossible to carry steam, or to obtain anything like sufficient pressure for heavy weights from natural elevations.

In smaller establishments, such as single warehouses and buildings under one roof, where very heavy goods have seldom to be moved, and where frequently the use of steam power for obtaining the artificial pressure in the accumulator is altogether out of the question, a lighter class of machinery is necessary—hence the adoption of the particular kind of hydraulic lifts now to be described. These lifts, which are all worked by natural pressure from a high level tank, can be used in any town where a good system of water supply exists; and one great reason of their not having become more general (in London particularly), is the fact, that, from various causes, the pressure obtainable from the water companies is inadequate for the purpose.

It is essential for the proper and economical working of hydraulic lifts, that a supply of water should be available at a pressure, allowing a cistern placed in or upon the roof of the building to be regularly filled; but this is far from being the case in most towns in the kingdom, and especially in London, where principally from the overtaxing of the street mains, it is found, by most of the companies, impossible to afford a high service as above described, except by making special provision to meet each particular case. A perfect system of water works should provide in every street, or, at all events, in every great thoroughfare or main street, a main pipe, the pressure in which should always be capable of throwing jets of water in sufficient volume to put out any ordinary fire without the aid of engines. Of course, the same pressure would allow the cistern for working the lift being placed at the highest possible point in the building; indeed, the cistern might then be dispensed with altogether, except for the possible want of regular supply, arising from the water being turned off in the main, in case of repairs, or other temporary hinderance.

There are many reasons, besides those incidentally alluded to in the course of my remarks, why hydraulic power is more suitable for this class of lifts than any other; one of the strongest being, that it is always available at any moment by the simple act of opening a cock or valve, without any labour in getting up steam, so long as any water remains in the cistern. Beyond this, the entire absence of any danger arising from explosion through the neglect of ignorant or careless workmen, which forms so great an objection to the use of steam or gas, especially in establishments where skilled labour is wanting—the ease with which they are managed, and the simplicity of the machines, render them capable of being worked by any person, so that in hotels or private houses, the owners are not at the mercy of the man who has charge of the apparatus, as is too frequently the case where machinery is employed.

These machines act with the greatest certainty, in consequence of the non-compressibility of the medium; the annual cost, with proper arrangements of service cisterns, can, as far as regards water in most establishments, be absolutely reduced to nothing, whilst the outlay for repairs, in consequence of the fewness of wearing parts, is also very small.

The uses to which it occurs to me that hydraulic lifts are more particularly adapted are the following: In warehouses where steam is not used. In public offices, for raising people, coals, books, letters, &c. In manufacturing premises and shops, for raising goods. In hotels and large establishments of chambers, for raising persons, luggage, coals, food, wine. In hospitals, for lifting patients, coals and food. In ordinary houses the want of back stairs might be greatly relieved by the use of lifts for raising coals and bulky articles, which do much damage to staircase walls and carpets.

In order to explain more clearly the precise description of lift I contemplate for the above requirement, I have thought it best to give an illustrated description of the apparatus I have adopted in my own practice, in the Brighton Hotel, a structure of considerable magnitude, and of great elevation. The lifts in question are now being constructed by Messrs. Easton, Amos & Sons. The diagrams on the walls illustrate them, and the plan of the hotel shows how they are applied to the building.

The lifts, five in number, will be used for the following purposes:—

A for passengers from the ground to the fifth or any intermediate floor, a height of 56 ft.
B for luggage, coals, linen, &c., from the basement to the fifth floor, a height of 77 ft. 7 in.
C for wine, from the cellar to the bar, 16 ft.
D for dinners, provisions, &c., from the basement to the fifth floor, for the service of all the different floors up to the fifth, 79 ft. 3 in.
E for dinners, &c., from the basement to the large coffee room, 16 ft.

All five will be worked by pressure from a cistern fixed in the tower, at the height of 124 ft. above the basement, and kept constantly full by a service from the mains of the water company: the waste water will pass into two large cisterns, placed over the lavatories on the ground floor, which will provide a supply for the whole of the ground and basement stories. By this means the lifts will be worked *without any annual cost*, the power being obtained by intercepting the water in its passage from the mains to these cisterns, whence it will be drawn for the usual domestic purposes of the establishment.

In constructing a lift for raising passengers three principal points must be attended to; safety, smoothness of working, and certainty in the action of the stopping and starting gear. I believe these requisites will, in this case, be fully attained.

Lifts A C and E are all on the same principle, acting by direct pressure precisely as is the case with Bramah's hydraulic press. The larger one A, shown by the drawing, No. 1, consists of a plunger or ram of cast iron (*G*), made in four lengths, screwed firmly together, and accurately turned to fit the stuffing box of the cylinder. The cylinder (*H*) is constructed in lengths firmly bolted together, and provided on the top with the stuffing box (*I*), the packing in which takes the place of the cup leather in Bramah's press, as being a more convenient method of keeping the cylinder from losing water when at work, in consequence of the difficulty of taking out so long a ram when the cup leather requires renewing. The pressure also in this case is not more than that upon the stuffing box of any ordinary pump; so that common hemp packing, saturated with tallow, is amply good enough for the purpose. A borehole is sunk to a sufficient depth below the surface of the ground to receive the cylinder, and this is lined in the usual way with an iron casing, so as to prevent the earth falling in upon the cylinder. This is kept in its proper position by two brackets cast on it, which are bolted firmly to the two cast-iron girders (*K K*) built into the walls on each side of the lift space. The water is brought to the cylinder through the pipe (*L*), and the waste is conveyed to the cisterns, supplying the lower part of the building, through the pipe (*M*).

On the top of the plunger (*G*) is fixed a strong cast-iron frame, forming the bottom of the ascending room, the sides and top of which are constructed of wrought-iron frame work, filled in with wood and glass, and fitted with a sliding door. On the top and bottom frames, at each side, are fixed two brass V shaped guides (*N N*), which work against two cast-iron Λ shaped guide bars (*O*) accurately planed, and bolted firmly to the walls in a perfectly straight and perpendicular line. The tops of the brass V guides are made in the form of a cup, in which a sponge kept saturated with oil will be placed, so as to lubricate the guides and guide bars every time the room passes up and down. To take off the weight of the ram and ascending room, a counterbalance is fastened to a strong chain which passes over the pulley (*P*) at the top, and is fixed to the wrought-iron ring (*R*) in the top frame of the room. The counterbalance (*S*) consists of a number of square cast-iron weights strung on a wrought-iron rod, and slides in a separate shaft or trunk, which keeps it in its proper position. All vibration and noise, which might be produced by its rubbing against the partitions of the trunk, are effectually obviated by placing between some of the weights layers of cork, felt, or other soft material projecting beyond the edges of the weights. As it is obvious that the ram in action, when out of the cylinder, weighs more than when in it (*i.e.*, that the weight of the ram, when at the fifth floor, is greater than when at the ground floor, by the weight of water displaced); the counterbalance chain (*T*) has been made stronger and heavier than is necessary simply to sustain the room, and its weight per foot is such that, as the ram rises, and the chain consequently passes over the pulley (*P*) from the side of the ascending room to that of the counterbalance, the extra weight thereby added to the latter is exactly equivalent to the increase in the weight of the ram by its removal from the water.

The water is admitted from the pipe (*L*) to the cylinder by the piston valve (*U*), which is so constructed that the flow into and out of the cylinder is managed through the same junction pipe (*W*); and between the starting valve and the cylinder there is introduced an apparatus (*X*) for regulating the speed of the lift, which is liable to variation on account of the load in the room varying on different occasions. For instance, the lift in question is capable of raising eight persons, at a given speed, which is at present fixed at sixty feet per minute, but it will frequently happen that the attendant may have occasion to go up to fetch persons from an upper floor, in which case the speed would be greatly accelerated. To obviate this defect, the regulator above referred to was invented by that eminently scientific amateur mechanic, Mr. Appold, F.R.S. It is an exceedingly simple and beautiful contrivance, consisting of a cast-iron box or chamber, through which the water passes in its way to and from the cylinder, and in which is suspended on a centre a brass quadrant, the face of which fits accurately the face of both the inlet and outlet passages. This quadrant is free to swing from side to side, and its action is as follows. When the velocity of the water, in either direction, does not exceed that decided upon, the swinger hangs in a vertical position without moving, but the instant the velocity increases beyond that point, *i.e.*, the instant the lift moves at too great a speed, the swinger rises and closes the passage to such an extent as to reduce the speed to the normal velocity, without impeding in any way the statical force of the water under any pressure whatever.

The starting valve (*U*) is put into action by means of the lever (*a*), one end of which is attached to a vertical rod (*b*), which is free to rise and fall in small cast-iron guides (*c*) fixed to the wall of the lift space. The other end of the lever is attached to the spindle of the starting valve. When the lever (*a*) is in a horizontal position, the water is shut off altogether from the cylinder, and the lift is stationary; when it is down, in the position, shewn by the blue line, the inlet is open and the lift rises; when in the position of the red line, the exit port is open, and the lift descends. On the vertical rod (*b*) is fixed, opposite each floor, a small pin (*d*). These pins are not directly over each other, but are one in front of the other, like the pins in a musical box, and project in front of the rod to such an extent as to allow of the side of the ascending room just clearing their points. In the ascending room itself is a handle (*e*) by which the attendant is able to move an upright bar (*f*), one end of which is fixed to the bottom of the room, and the other describes the arc of a circle, and slides in a groove of brass (*g*) fixed in the side of the room. On this bar, outside the room, is fixed the lug (*h*), which projects far enough to come in contact with the different pins. These pins being fixed in parallel vertical lines, it will be seen that the lug on the ascending room can only come in contact with one of the pins at once, and, if placed by the attendant opposite that pin, it will escape all the others. The brass segmental groove (*g*) inside the ascending room, in which the bar and handle works, is engraved with the names of the different floors, and an index or pointer (*i*) is fixed to the handle, so that the attendant may set the lug, outside, opposite the pin on the rod which projects at the floor indicated by the pointer. When the lift reaches that floor, the lug (*h*) comes in contact with the pin (*d*), raises the rod (*b*), and so moves the lever from the position shown by the blue line to a horizontal position, and the lift stops. To the top of the vertical rod (*b*) is attached a hand line (*k*), passing over a small pulley at the top, and then down through the ascending room to the bottom of the lift space; and to it is fastened a weight (*l*) sufficient to counterbalance that of the vertical rod (*b*). By pulling this rope, either up or down, the attendant can at pleasure start, stop, or reverse the lift. When the lift has come to a standstill, as before described, at the floor indicated on the engraved plate (*g*), the attendant will alter the position of the handle, till the index is opposite the next floor at which he desires to stop, he will then pull the rope, so as to send the lift either up or down, and the lug will again come in contact with the pin at the particular floor, and stop the lift exactly at that point. Water being, to all practical limits, incompressible, the lift is stopped the instant the water is shut off by the lever, and stands exactly level with the floor or landing. The exactitude with which this can be done is of great importance in an establishment such as a large hotel, where ladies and children frequently use the lift; as they might become nervous should the attendant, through carelessness or awkwardness in manipulating the hand line, make the lift vibrate above and below the floor. I think the description of the guides, ram, and starting gear, will convince you that two of the requirements enunciated are fulfilled, smoothness of working and certainty of action; and I shall now say a few words as to safety.

Now, what possible accident can happen to the apparatus?

1st. The counterbalance chain might break (although its proof strain is more than twenty times as much as the greatest load it will ever have to bear); but the only effect upon the lift would be to cause the extra weight thrown on the plunger to overcome the force of the column of water, which thereupon would be forced back again to the cistern in the roof, and not at any dangerous velocity, Mr. Appold's regulator keeping it at the normal speed.

2nd. The starting valve, or inlet pipe, might burst; then again the regulator would prevent the escape of the water at too great a velocity, and the lift would simply descend to the bottom, the only inconvenience being the waste of the water.

3rd. The cylinder might split, or even a piece might blow out of it; but, in consequence of the water having to pass out between it and the sides of the bore pipe, the friction would be sufficient to prevent any very great acceleration of velocity.

4th. The only remaining accident that could happen, but at the same time the worst, would be the breaking of the ram itself; but this is almost an impossibility, as before arriving at the breaking point it would have to deflect to such an extent as to effectually jam the guides against the bars, and so relieve itself of the weight, and at the same time prevent the cage from falling.

The apparatus just described will be capable of raising eight persons, averaging ten stone each (total, 1120 lbs.), and will cost, including every expense except the cisterns and pipe from them to the lift, from £600. to £650.

The lifts C and E are exactly similar in principle to A; but, from only travelling between two floors, the starting gear is greatly simplified, being merely a three-way cock with a handle and engraved plate attached, to indicate which position the handle must take, for the lift to move either up or down. Lift C will raise 50 lbs., and will cost about £75. Lift E, 100 lbs., and will cost £115.

By the side of lift A will be fixed lift B for raising luggage, which will be on a different principle. This, as well as lift E, will consist of a horizontal cylinder and piston, giving motion to rack and pinion gearing, which causes a hauling drum to revolve, and thus winds up the chain to which the cage or lift is attached. The same species of starting valve and gear is employed, so that the porter who shows the passengers to the lift can put the luggage into the cage, and set the handle to the proper mark on the index plate; and the cage will stop at the floor until unloaded and sent down again by pulling the rope. This lift will raise 600 lbs., and will cost from £400. to £450. Lift B will be of precisely similar construction, but will only raise 100 lbs., and will cost about £280. to £300.

A complete system of communication is made between all parts of the building, wherever any of the lifts start or stop, by means of bells and speaking tubes. The above described provision of hoisting apparatus will, in my judgment, serve the requirements of the large establishment in which it is introduced, and will render the service of its several parts perfect and economical, as well as obviate any objection that might otherwise be raised to the upper stories, in consequence of the number of steps leading to them.

My subject is by no means exhausted. I feel that I have omitted to allude to many other purposes to which this description of apparatus may be applied, and that as soon as it shall be generally recognized, and a more ample and efficient supply of water shall have been provided, facilities will be given for the occupation of space now almost unproductive. I have only endeavoured to bring the general subject forward in the hope that any deficiency on my part will hereafter be made good by more able members of our body; and in conclusion would suggest that the tone of thought induced by mechanical contrivances applied to modern buildings is in the highest degree worthy of cultivation, and that the remark of our late lamented President, Professor Cockerell, was pointed in this direction so long since as 1856, when, alluding to modern invention, he summed up his lecture at the Royal Academy in these words:—"To turn all these novel materials to the best account should now employ our ingenuity. A revolution is inevitable in interiors, and modifications in exteriors. Let us look to the daily evidences of transition, and help them with those forms and laws of taste which the architect of the beautiful is best qualified to recommend, and there need be no fear but that the builders of the nineteenth century will, in their structure at all events, exhibit abundant originality. If we labour at a competent exhibition of these novelties with all the accompaniments and law of taste, it need never be doubted that the year 1900 will display in architecture that which never before was dreamt of, characterizing the century in a manner worthy of its extraordinary progress in civilisation."

Mr. **Edward Easton**, Visitor, said that if any questions were put as to the details of the lifts themselves, and their mode of action, he should be happy to answer them. Many forms of lifts were in use and the question now before the meeting was the especial advantage of hydraulic lifts over all others. It was scarcely possible to over-estimate the importance of the application of such apparatus, whether worked by hydraulic or steam power, to buildings of the class now so generally being erected in various parts of the country, especially in London and large towns, where ground space is very valuable; and he thought it well worth the consideration of architects that they should make themselves acquainted with all the different forms of appliances which could be usefully and economically adopted. There were two or three points to which, as an engineer, his attention had been directed in the construction of the lift in question. The main point, and that which would strike all, was as to the strength of a ram of such a length as that shown in the drawing, which however was not an extraordinary length, because he believed the direct acting principle had been carried in other cases to even a greater extent. But if a little consideration were given, it would be seen that the strength of the ram itself was sufficient to support any weight that would be brought to bear upon it. In the calculation of strength, the first question to be settled was whether they should look upon the ram as a column with a flat-ended top, or with a round top. The experiments made by Mr. Eaton Hodgkinson showed that a column supported upon a flat base, and having a flat top, would bear about three and a half times as much as a column supported on a round end, and bearing the weight on a round top. This ram was, doubtless, round-ended; but as the cage was confined between two guides, so that it could not move laterally, it partook of the character of a flat-headed column; that is, the weight when out of the centre would come upon one edge of the column, and give greater resistance to bending, and therefore greater strength to the ram. In any case, they had ample strength. The ram was eight inches in diameter, and from one half to six-eighths of an inch in thickness; and the breaking weight calculated, even as a round-ended column, was nine and a half tons; and the greatest weight that could come upon it, supposing the counterbalance chain to break, could not exceed two tons. Then came the question, whether, in consequence of the ram being considered as a flat-headed column with a round base, they ought not to multiply the breaking weight by 1·75, thus making it 16·6 tons, or eight times the greatest weight that could, in case of accident, be thrown upon it.

Mr. **Alfred Smee**, F.R.S., Visitor, said, as chairman of the Brighton Hotel Company, in whose building these appliances had been carried out, he would say that the directors took special pains in the matter of the construction of these lifts, which had been so fully described. It appeared to the directors that the success of their undertaking partly depended upon the excellence of this apparatus. He might say it had attracted a great deal of attention, and had demanded both of the architect and of the engineer, he believed, more than usual skill. The apparatus in its present form, the directors were most thoroughly satisfied with, as far as they were yet able to judge of it. In the first place, the idea of safety seemed to be brought before them to the fullest extent. He did not know anything which gave a greater idea of safety than a room in the form there represented. The ram itself was exceedingly strong, and passing down into the ground seemed to prevent in any way such a rupture as would lead to any unfortunate occurrence. Another thing they had stipulated for was that the action of this ascending room should be perfectly smooth and without lateral or vibratory motion. This had been obtained in the most effectual manner by these guides, which acted as smoothly as the bed of a plane, and were fixed to such a nicety that he hoped the apparatus, when in use, would glide up and down perfectly noiselessly, and with a scarcely perceptible motion to the occupants of the room. Then, again, it was a matter of importance that the persons inside this "up-stairs omnibus" should not be impressed with the idea of passing objects in the ascent and descent of the chamber, and that had been effected by making the room a completely closed one, with a lamp burning inside, by which the occupants of the room would not be aware in which direction they were going; and the directors expected it would glide up and down, and be available all day long, and every day. Then came the question of the cost of working, which in this case was *nil*, as virtually the motive power—water—was obtained for nothing. The water necessary for the purpose was stored at a certain elevation, and used at a lower level, and the passage of the water from the higher to the lower elevation gave them the necessary power. The cost of that had been arranged with the Water Works Company at Brighton, on terms which he thought were fair to them and remunerative to the Water Company. They paid at the rate of a shilling per 1000 gallons for the first 1,000,000 gallons, and sixpence per 1000 for each 1,000,000 gallons afterwards. That would bring the entire consumption of water within a reasonable expense. Mr. Whichcord, in his paper, had raised the idea that this appliance was available only in certain towns. That was true to the fullest extent. At Brighton, when application was made about the water, the directors were told that they could have it in any quantity they wished for. They had an unlimited supply of water from the chalk formation, and could supply it at any desired pressure. If they compared that with London at the present time, they saw what the difference was. At this moment the supply was so short in the metropolis that there was scarcely one house in a dozen that had more than a few gallons of water in the tanks on a Sunday evening. The difficulty of obtaining water for these mechanical contrivances was a great and growing evil, and was felt universally wherever we go. The shortness of the supply of water was such that we were unable to obtain what was required for domestic purposes, much less for those mechanical contrivances which we might have in our houses if the water companies only enabled us to have the quantity we want at a fair and remunerative price.

Mr. CHARLES FOWLER, Fellow, inquired how many gallons of water were consumed in the raising of the principal "lift."

Mr. WHICHCORD replied that the ascent of ten feet of the "lift" displaced about twenty gallons of water. That water, however, was not wasted, but passed off into cisterns for the general supply of the building.

Mr. CHARLES FOWLER—The water, as I understand, can only pass out at the bottom; therefore you cannot supply any cisterns except those on the ground-floor which you allude to.

Mr. WHICHCORD said, inasmuch as there is a complete pipe, the water will rise above the point at which the top of the room may be by the pressure of the cage rising. If you put into the room one or two persons more it will drive the water higher again into the cistern. In this case it drives the water not only to the top of the room, but to the story above it for the supply of the closets; therefore we make the room half an inch bigger in dimension to make up the extra velocity to drive the water into the cisterns on the floor above. The water does not run away from the ram, but rises above it.

A MEMBER asked whether the counterbalancing weight was equal to the whole weight of the chamber, or what was the amount of the counterpoise.

Mr. EASTON replied it was equal to the weight of the chamber and that of the ram in the water. The weight of the ram was greater out of the water.

Professor KERR, in proposing a vote of thanks to the author of the paper, said the introduction of the hydraulic lift into buildings of a domestic character was an interesting question to the architects of the present day,—one of those matters which might involve future modifications of plan. At present, however, so far as architects were concerned, it was simply a question of money: to raise a certain amount of weight to a given height required the expenditure of a certain sum of money,—in this particular instance, taking the form of so much water supplied at a certain altitude at a certain cost. The gentlemen interested in the Brighton Hotel were anxious to explain that the water in their case really cost nothing—that was their main point. In other words, so far as regards the use of it for the purposes of their lift, it was said to cost them nothing. The water was delivered at a high level to be used at a low level. After having served the purpose of working this moveable room, the water was only at the level required for other purposes. This arrangement, however, would but seldom be met with. A great mass of water delivered at a very high altitude, to be used at a very low altitude, could scarcely be had in London, for example. Nevertheless, he congratulated the designers of this apparatus upon their success, and he hoped their calculations would be fully borne out in working.

Mr. C. F. **Hayward**, Hon. Sec., remarked, to bring the matter to a practical point they must calculate what was the cost of the water used in lifting the room from the bottom to the top, supposing all that water to be wasted. As regards the lifts for passengers in hotels the cost might be calculated at so much per journey; and in some places, as a matter of economy in this respect, gentlemen were requested to wait till there was a sufficient complement of persons to send the room up, consequently they were not so frequently useful as they otherwise might be. At the Grande Hotel in Paris he could not get a journey up by the ascending room at all. The cost at some hotels was calculated at a penny, or something less, per journey, which though small in itself, yet when multiplied by the great number of journeys made in the day with luggage and other things, and carried on continuously from day to day, made a considerable item at the end of the year.

The **President** thought manual labour would be much more costly.

Mr. **Easton** said with regard to the cost of the water in these matters, hydraulic lifts, though not exactly the same as in this case, had been at work in hotels for a long time. At the Grosvenor Hotel lifts had been in operation for a year and a half, the principal one being 110 feet in height. The total cost of the water supply of that hotel he believed did not exceed £200. a year, and of that amount about £50. was put to the debit of the lift, which was owing to the arrangements at the lower part of the building not having been perfect for the utilisation of the water used in working the hydraulic apparatus of the lift. It was all wasted, but arrangements were now being carried out for using the greater portion of that water within the establishment. With regard to the lift not being always accessible to visitors at the hotels, he believed in the case of the Grosvenor it was used at any time, and for every person who wished it. In the Grande Hotel he believed the apparatus was worked by a gas engine.

Mr. C. F. **Hayward** would like to know, independently of the question of utilising the water afterwards, what was calculated to be the cost of a journey in ordinary cases. Armstrong's hydraulic lifts were used in the granaries of the Great Northern Railway, and elsewhere. They took up so many sacks at a time, and delivered them on the different floors. If the corn remained in the granaries any considerable time the cost would be comparatively small, but if the cargoes of corn were shifted very frequently it became a great item of expense.

Mr. **Easton** remarked in the case of the great Northern Company the lifts were worked by Armstrong's apparatus with the accumulator. That did not put the case in a fair light. Take the case of this particular room, from the ground floor to the top floor, the discharge of water would be about 100 gallons per journey, which at an average of ninepence per 1000 gallons would be about three farthings, assuming the water to be wasted, which it was not. At the Grosvenor they made about eighty journeys per day on the average, the cost of which was about 6½d. per day, calculating each journey at three-eighths of a penny.

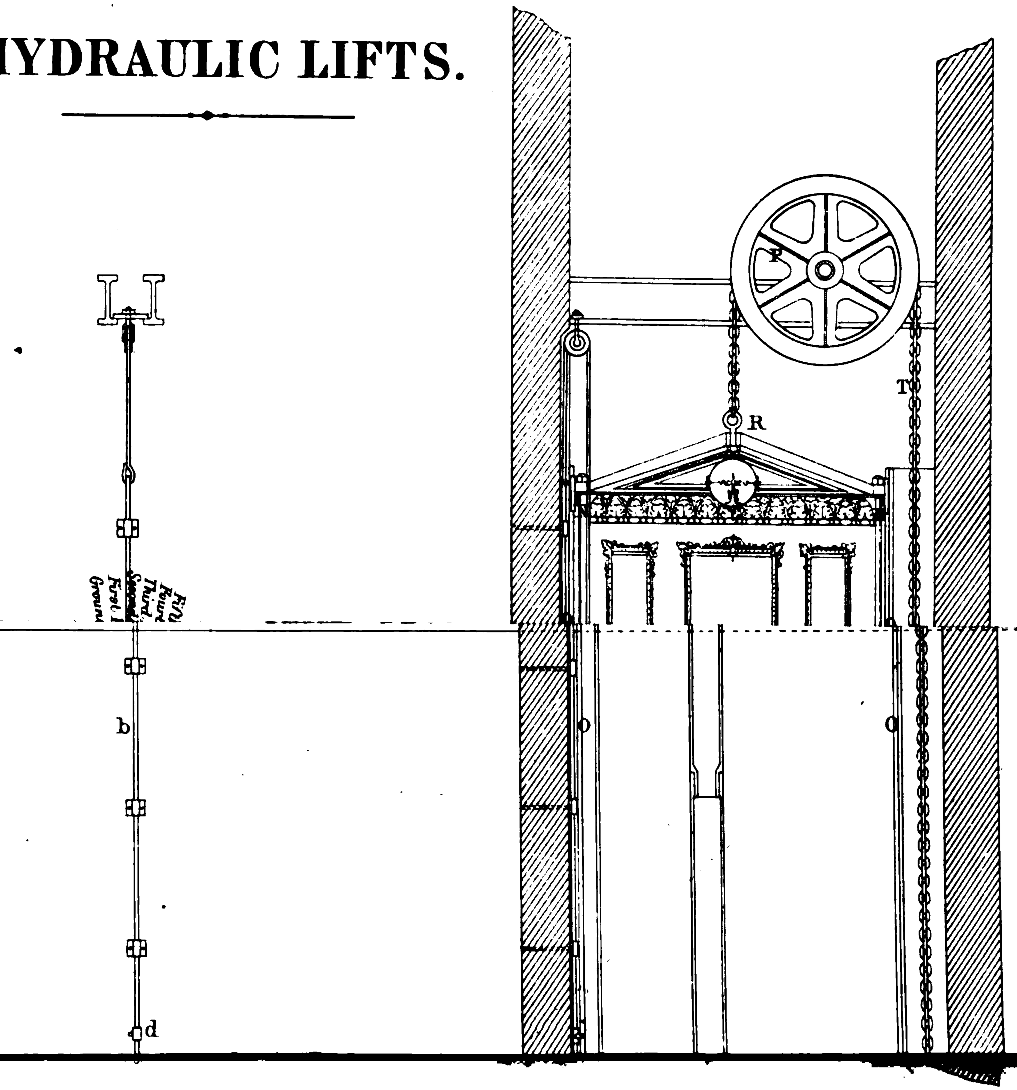
Mr. **Smee** remarked that the real cost was that of raising the water from the lower level to the upper cisterns, a height of 90 feet, which would be equal to about one-tenth of a penny per journey from the bottom to the top.

Mr. J. W. PAPWORTH, Fellow, in seconding the vote of thanks to Mr. Whichcord, remarked that the employment of lifts resolved itself into two classes, viz., for warehouse and for domestic purposes. The question of danger in warehouses was met within certain limits; but, on the question of domestic use, he did not see any way of assuring the majority of persons who were timid that there was no danger of the whole cage coming down suddenly from top to bottom. Mr. Appold's regulator was certainly a happy invention, and was calculated to set the mind at ease upon two of the probabilities of accident, but a third remained. The great difficulty, he thought, was to persuade persons to use such apparatus when it was provided; he thought most persons would use the stairs in preference; and he did not anticipate that within his own time he should hear of staircases being superseded by these lifts. The loss of the counterbalance weight, and the fracture of the piston, seemed to be fully compensated for by the regulator spoken of; but what would be the result if the cylinder below the regulator burst, and what would be the probable cost of such an accident?

Mr. WHICHCORD replied, that in the very improbable event of any rupture of the cylinder below the level of the ground, the water could not rush out very quickly, because of the iron casing enclosing it.

The vote of thanks to Mr. Whichcord having been passed unanimously, the meeting adjourned.

HYDRAULIC LIFTS.



P. *Large Pulley.*
R. *Ring at top of Room to fasten Chain to.*
S. *Counterbalance Weight.*
T. *Chain.*
U. *Piston Valve.*
W. *Junction Pipe from Piston Valve to Cylinder.*
X. *Regulator.*

a. *Lever.*
b. *Rod (called Starting Rod in Drawing.*

Scale of Feet.

10 9 8 7 6 5 4 3 2 1 0 10

A DISCUSSION

Upon the Paper read at the Ordinary General Meeting of the Royal Institute of British Architects, Nov. 30, 1863, by F. C. PENROSE, M.A., Fellow,

IN FAVOUR OF THE DECIMAL BUT AGAINST THE METRICAL SYSTEM OF MEASUREMENT,

At the Ordinary General Meeting of the Royal Institute of British Architects, February 1, 1864.

THE PRESIDENT, Professor DONALDSON, announced that the discussion on Mr. Penrose's communication on decimal weights and measures would now take place.

Mr. F. C. PENROSE, Fellow, said he would only add to his former remarks on this subject that he wished to be understood not so much as an advocate for the change of our present system as for the due consideration by the Institute of the best form and direction which should be given to the change which appeared to him sooner or later to be inevitable; and he would observe further that his main object was, while advocating the decimal to avoid the metrical system, which he thought undesirable for many reasons, stated by him on the former occasion. Two plans were proposed; one the use of the decimal foot, which had much to recommend it, and the other that of making a slight change in the foot which would then become the measure, which for the sake of being more readily understood he had designated the "span," a specimen of which he would hand to the President. It was the ordinary drawing scale of ⅛th of an inch to the foot. It differed (with scarcely appreciable error) five per cent. from the third of the metre, and 5000 such spans would make a mile, and 200 would make the side of a square acre, and 70 such miles would be exactly a mean degree of latitude, so exactly that such *degree* would not differ in latitude 45° by so much as the length of the table in front of the President's chair. These were considerations which afforded in his mind plausible reasons for its adoption. The main thing, however, was to get a decimal system; and, secondly, to avoid being saddled with the French metre.

Mr. WHITE, Fellow, was glad to find that Mr. Penrose had somewhat modified his views as to a *wish* for change, and he thought Mr. Penrose was one of those best entitled to speak upon such a matter, though he could not agree with his conclusions. He (Mr. White) did not think that the House of Commons, by its second reading of the Bill, introduced into Parliament on the subject last year, intended to adopt the principle that the change was desirable, but only to allow of the principle being discussed: nor did he think that the Institute was, or ought to be, "committed to a change," merely because the Council had petitioned, without giving the general body the opportunity of expressing an opinion. The subject consisted of two parts, viz., Uniformity of System and Decimal Computation. And these must be kept quite distinct in discussing the merits of the case. Uniformity was most desirable,—uniformity not with foreign nations, but amongst ourselves. General uniformity, whether of system or of standard, with foreign nations was utterly unattainable, for scarcely any two nations agreed together in this any more than in language or habit of thought. Uniformity amongst ourselves was to be obtained not by entire change of system, but by amending and perfecting our own national system, which was excellent, and contained all the elements of the most perfect system possible, although it was unhappily confused and complicated in its details and in the mode in which it was carried out; and the remedying of this was the proper place to begin. The English system consisted in the happy combination of the decimal *with* the duodecimal; and this gave it an elasticity and comprehensiveness which made it superior to all others. But it is not carried out at present with any pretensions to uniformity; for example—112 lbs. to the cwt., and 16 oz. to the lb., 272 feet to a rod, are no part of a duodecimal system any more than they are of a decimal. They are clumsy adaptations from the traditionary systems, and therefore the duodecimal system must not be condemned on account of such anomalies, any more than by the gross inconsistencies of measuring work by various standards; as, *e. g.*, walling by an 18 ft. perch in Cornwall; a 16½ ft. perch in other counties; or by a rood of 63 ft. in the North Midland Counties. Then, again, uniformity would be more attainable by amending and enforcing our own practical detail than by *permitting* an entire change. The cwt. might be made of 120 lbs. as the wine pipe is 120 gallons, and the sub-division would naturally fall into their places. Without altering our foot, the acre might be 200 ft. × 200 ft. = 40,000 ft., instead of 43,560 ft. as now, and the mile might be 5000 feet instead of 5280 feet as now. The square mile would then contain 625 acres, the same as Mr. Penrose proposes, but the capacity would be less by a twelfth part. But it would be infinitely better to make the acre of such a number of feet as will throw into yards; *e. g.*, 45,000 feet to the acre, instead of our present 43,560, or, as proposed by Mr. Penrose, 40,000 for superficial measure. So also might have 6,000 feet for lineal instead of 5,280 as at present, or 5,000 as proposed by him. The mile would then consist of 8 "lines," of 25 yards each, and the acre of 8 "square lines." The YARD ought *not* to be sacrificed. The yard or pace is the most universal of all measures throughout the world, and through all periods, its quantity, of course, varying; and it is also the most practically useful. This fact suggested the "metre" for adoption in France, but the third of a metre is essentially incompatible with the decimal system of sub-division, if the foot (or span) is to be retained; and there is no reason why the foot should be given up, if applied in the manner which has been indicated. The decimal system, if carried out fully, proves imperfect; and although for pure numbers and for abstract calculation it may be allowed to be the best, yet it cannot be so considered for common practical daily use. It is, as it were, the finer instrument which might be used for the finer work, but not the rough and ready instrument best fitted for daily life, except in combination with the duodecimal system. For such fine calculation as Mr. Penrose had so ably made in determining the proportions of the Parthenon, and for all application of logarithms, the decimal system would serve best, but he did not think that the common mason and carpenter would be able or likely to turn it to their account. The division of the circle was both theoretically and practically one of the very first points to be considered in all geometrical calculations; and in this at least the decimal system had proved an entire failure, so that although the French had divided the right angle into 100° (the circle into 400°), yet they found its inconvenience so great that the astronomers had abandoned it and recurred to the old subdivison (360°). This point proved in favour of his argument, 360°* being the most *complete* number for practical use, according to the system which he was advocating, 12 × 10 × 3 = 360. Undoubtedly it is easier to divide and to multiply by 10 than by 12; but these were not the only nor the principal calculations to be taken into account, and it would be found that this advantage was not enough to compensate for the disadvantages in other respects. He granted, in reference to Mr. Penrose's remarks (p. 45, No. 4), that the decimal written expression $80{\cdot}\bar{3}$ ft. (the bar over the 3 indicating a recurring decimal) was as good as the duodecimal 80 ft. 4 in., but for speaking or dictating 3 ins. was *better* than $\cdot\bar{3}$ ft.—by whatsoever terms it might be agreed to call it. He granted that $80{\cdot}\bar{5}$ ft. was *better* written than 80 ft.

---

* The system is said to have no counterpart in nature, but surely the universal agreement of the whole world as to the use of 360 for the days in the years, till modern science reduced the inaccuracy to its present fine solution, makes its adoption appear in the light of a natural, rather than of a merely arbitrary or accidental choice.

6⅔ in., but he maintained that for the fraction, a simple number of inches was better than any other mode of denominating a fraction; and that fractions of feet (as of shillings also) were avoided by the duodecimal system, in the proportion of 18 calculations to every 8 of the decimal, whilst of the others which had a fraction, there were in the duodecimal 16, which had simply a number of inches (or pence, as the case might be), (*see* A.) as against only 8 in the decimal, which had a *simple* decimal fraction of a single figure (*see* L.) whilst of the others there were only 20 of compound fraction, as against 28 which had complex decimal fractions: and he had taken all the divisors from 2 to 9 with all the possible remainders—and all multiples of each other free of fraction, up to 10, *e. g.* three instances:—

6)3 ft.
Duodecimal result = 6 in. (A.)
Decimal ,, = ·5 ft. (L.)
7)3 ft.
Duodecimal result = $5\frac{1}{7}$ in. (B.)
Decimal ,, = ·428 ft. (M.)
8)5 ft.
Duodecimal result = 7½ in. (C.)
Decimal ,, = ·625 ft. (N.)

And in multiplying, or in squaring dimensions, we have without a fraction:—

Duodecimal, 2 × 6 parts = whole	Decimal, 2 × 5 = whole
3 × 4 ,, = ,,	4 × 5 = ,,
And so on 18 times.	And so on, only 8 times.

And this applied to all calculations involving pence and inches, to simplify which, the decimal system was professedly advocated. He admitted that the duodecimal system involved a greater amount of application and learning in the first instance, but he maintained that so far from this being lost or waste labour, it was the very thing which gave to the English commonly, such a practical knowledge of the value of numbers, and made them good arithmeticians, and that the greater knowledge gave the greater advantages, as was the case with all learning. He could not consent to recognize the German system, even as duodecimal, much less as embracing that which made the English system so elastic and comprehensive. The Germans divided their small coin—the coin which takes the place of our penny—into twelve parts. And their largest coin, in common use and reckoning, was only 24 or 30 such pence; equal to three shillings of our money: verily, a poor assimilation to our own. Again, he did not consider a "permissive" Act was requisite to allow of anybody having their own rules or scales divided into tenths—and hundredths; but thought that such an act would legalise an amount of confusion and probability of error, with the absence of the uniformity that was aimed at, for the next fifty years, without any sufficient advantage to be gained at the end of that time; for the advantage ought to preponderate very vastly to make such a radical change justifiable. In conclusion, he had only to say that, desirable as an amendment would be in very many particulars in the present English tables, yet he, beyond all things, deprecated an entire revolution of system; still he must say, that if, unhappily, a decimal system and a radical change were forced upon us, he hoped it would be in accordance with the scale of "spans," so ably worked out by Mr. Penrose.

PROFESSOR KERR, Fellow, doubted whether this subject ought to have been brought before the Institute at all; still more whether they ought to have petitioned Parliament in favour of a decimal system of currency. It seemed to him that there would be great disadvantage in attempting to introduce the decimal system. They must look at it as practical men, not as mathematicians. The decimal system enabled them to calculate mathematical problems with the greatest nicety, and they had already adopted it for all such purposes, but when they came to ordinary calculations facility was the great point. What was the number *twelve?* Simply that number which met the continual practical requirements of subdivision into two, three and four. The number *ten*, on the contrary, was merely the accidental number (so far as enumeration goes) of a man's fingers. The Arab numerals of common use proceeded upon the basis of counting by the fingers. That was the sole origin of the decimal system. But it was plain that the number twelve had quite as sound an origin in another way, arithmetically more so. It divides by 2, by 3, by 4, by 6, and almost by 8 and by 9; 8 producing ⅔rds and 9 ¾ths. The number 10, however, would divide by 2 and by 5 only. He had seen the working of a decimal currency many years ago in America, and he considered there was a great deal of inconvenience as the result. As was well known American money was reckoned in dollars, and hundredth parts of a dollar; and no doubt very pleasant and simple it appeared upon paper, so long as division by 10 was the only rule. But the Americans of course had continually to divide by 2. This they could accomplish; but here their difficulties began. They could not do without dividing by 4, and this they did not accomplish so well; they got at the quarter dollar (our shilling) of 25 cents, a very inconvenient number. Then, further, division by 2, continually required, produced 12½ cents (our sixpence), which again divided by 2, as was every moment necessary, produced 6¼ cents. There thus arose the circulation of two separate currencies, one decimal from the dollar, the American coinage and another—and this probably by far the most useful—duodecimal from the cent, in the shape of Spanish coins. The latter coins represented 6 cents and 12 cents. Accordingly, there came to be constant irregularities in computation. If an article was priced at the eighth of a dollar (our sixpence) the question arose whether it was to be paid for with 12 cents or 13. So, again, as they had a Spanish coin worth 6 cents exactly, and an American coin (the dollar ÷ 2 ÷ 2 ÷ 2) worth 6¼ cents; there was here also amongst the poor a greater because a meaner difficulty. All this was productive of a great deal of confusion, and sooner or later the Americans would have to alter their decimal system, instead of our altering ours to suit theirs. Moreover, to divide their dollar by three (one of the most frequent of transactions) was practically impossible, except in the compromised form of 33 cents. The only real divisor of the decimal system, namely 10, was obviously unwieldly, to divide by even its half 5, was practically never needed, and the only serviceable divisors in the decimal system were 2 and 4, a state of things most inadequate for common affairs. As for a legislative enactment, he was sure Parliament would never pass it, and indeed he thought the friends of the decimal system need give themselves no further trouble about it. Mr. Penrose had laid before them a system which, so far at least, did credit to his well-known mathematical skill. But surely the compromise of accuracy which it involved was most fatal. As a mathematician, Mr. Penrose could hardly stand long by a system of calculation which, as he himself fully acknowledged, compromised the essential accuracy of calculation on every hand. Mathematicians no doubt required for their purposes the decimal system pure and simple; and they posseseed it, and nobody interfered with it: but common reckoners equally required the duodecimal system, and under existing practice they equally possessed it, and there was no need for the mathematicians to interfere with it. The two systems co-existed in perfect amity, and would, beyond all doubt, continue so to do.

Mr. Jennings, Fellow, thought in the first place no necessity had been shown for any change of the present system. The simple question of a change, unless there were strong reasons for it, was an evil. It interfered with previous calculations and with the whole system of trade based upon those calculations, and also with the averages of produce in a variety of ways. The system all over the country was based for produce upon yards, feet and inches, and upon acres downwards for measurements of quantities. He admitted that great inconvenience was occasioned by the difference of weights and measures in various parts of the country, and, in some instances, in different parts of the same county.

That was a subject most important to be taken up, and it could be dealt with so as in a great measure to remove the evil. His own view of effecting it would be this—in any proceedings in law taken upon any bill the calculation should be made upon a fixed legal system, not that of the Cheshire acre, not of the pound avoirdupoise in one case and the pound troy in another. There should be a fixed standard for a pound weight all over the country, and that, he submitted, could easily be done. They should, as far as possible, endeavour to make the weights and measures uniform throughout the kingdom. With very little difficulty they might get rid of the foolish rod of brickwork by reducing it into yards and feet direct. That was a thing easily done; but if they altered the general system it would occasion great inconvenience for a long time, and why should they have that inconvenience unless it would be shewn to be absolutely necessary. He believed he was correct in stating that chemical combinations were not decimalised. There were a comparatively small number of subjects which combined in decimal proportions to what combined in duodecimal proportions. He entirely concurred with his friend who preceded him, that practical men would never adopt the decimal system, and if Parliament consisted of practical men, they would never pass it; and further, if it were attempted to be introduced by compulsion, it would occasion serious disaster throughout the whole country. There was a difficulty even in getting uniformity in a single county: what would be the difficulty attendant upon an entire change of system throughout the kingdom? He hoped the Institute would not commit itself to this scheme.

Mr. THOMAS MORRIS, Associate, said it appeared to him that the object of legislation should be to assimilate, if possible, the measures and systems of nations; the consideration of details was a matter of minor importance. It also appeared to him that, within the last few centuries, science had enabled them to appeal to Nature for the proper standard. The solar day was now divided into 86,400 seconds, but if it were divided into 100,000 parts, instead of 86,400, then a pendulum vibrating one of those seconds 100,000 times a-day would measure about 30 inches. That appeared to him to be a very convenient standard of measure—as much so, perhaps, as the French metre or the English yard. The pendulum would differ a little at the equator, where it would be shorter as compared with the poles; but he thought if the equatorial pendulum was taken as the unit of measure, it would be accepted by all nations on both sides of the equator, and out of that might arise a national assimilation of measurements. When a standard of length was agreed on, one of capacity would follow with great facility; and when a measure of capacity was established, one of weight might be introduced with equal simplicity. He thought these initiative principles should take the lead in the discussion of this subject, and then the details would follow, as a matter of course.

The physical relation of length and weight may be thus illustrated:—

	Rate of fall in a second, in feet.	Length of pendulum, in inches.
Equator	16·0463	39·02
Middle Latitudes	16·084	39·114
London	16·0954	39·13908
Spitzbergen	16·1264	39·2164

THE PRESIDENT, Professor DONALDSON, could not allow this discussion to close without saying a few words. He did not understand advocates for the duodecimal system, for our method of computation was not founded upon duodecimals alone; and though it was true the foot was twelve inches and the shilling twelve pence, what was the pound sterling? and what the penny? and what the pound weight? Take the whole system, it was in no particulars duodecimal or decimal, but a strange confusion through the whole series of weights and measures. If, therefore, gentlemen advocate no change, were we to be left in the abnormal condition in which we are now? The objections he could not understand.

What was the *foot?* It had no positive existence in nature, whether the foot of a giant or of a pigmy was taken as a standard, but if we took the *metre* it was a measure in physical nature, a geometrical unit, and therefore to start from it as a measure seemed a most scientific way of proceeding. He thought it should be a great object to have uniformity with foreign nations. Why should they hold to a standard of their own instead of a common one by which they could understand the measurements or monies of other nations. Rgarding all nations as one common brotherhood, the greater the uniformity of thought, language and manners, the more the common state of civilization would be advanced. One gentleman had advocated the yard as an unit of measure; but if the yard, why not adopt the metre, which was a measure positive and decided? It was stated that the decimal system, if adopted under legislative sanction, would only be permissive, and of course it would be so at first. It required half a century in France to establish the metre or decimal system there. Any Act of Parliament on the subject must therefore be only permissive to accustom people to its use. Great mathematicians proved how much facility there was in the adoption of decimals, how much that system abridged arithmetical education, how easy it was to teach it in the common schools of the country, and how it saved years of labour. The plough-boy, instead of having to learn the complicated and varied weights and measures of the country, would have a simple system put before him; and in lieu of devoting three years to arithmetic he would accomplish it in one. It had been said that practical men would never adopt the decimal system; but the truth was that the most practical of men, the engineers, did adopt the decimal system, and had introduced it to a great extent in their measures and calculations.

(Mr. KERR remarked only for mathematical calculations, not for practical matters.)

The PRESIDENT added that he thought the arguments against the decimal system failed, particularly with regard to money. They had the decimal in the pound sterling, and the duodecimal in the shilling, and no system with respect to the penny!

Mr. PENROSE said, without question the duodecimal system represented multiples of 2, 3 and 6, and the decimal system only those of 2 and 5, and a larger proportion of numbers was divisible, without fractions, by duodecimals than by decimals, but he regarded it as a practical question, and there were practical considerations in favour of the decimal system. In measuring an object, they did not expect to find the duodecimal sub-divisions exactly hit the length of it. They had to consider the nearest point to arrive at, and the decimal sub-divisions found a point just as near, and easier to read off. He had worked a great deal with both systems, and had found out which was easiest to himself, not only as a mathematician, but in practical measurements. He invariably measured by decimals for his own use; though he had not adopted them in his business communications. He was glad to find that, at all events, there was a strong feeling in favour of uniformity, which might serve as a precursor to the decimal system. He could not admit the argument of his friend, Mr. Kerr, that the system he proposed compromised accuracy, for if the span system he proposed found favour, it would be accurately 25-24ths of the foot; so that the standards would not have to be changed on its account. When he spoke of the mile of 5,000 spans, as practically our present mile, he did not mean that it was so accurately, but so near to it that between London and Southampton, for instance, it would not make a difference of many hundred yards.

Mr. KERR remarked that it might make a serious difference in questions of boundaries nevertheless.

Mr. PENROSE added, that the object was to obtain the advantage of calculating with simplicity. He did not set up any particular plea for the "span" in preference to the decimal foot, but he did plead for the decimal system and the retention of our national standard.

The meeting then adjourned.

ERRATUM.—In the 4th line of the Postscript to the Rev. H. T. Ellacombe's Letter, page xiv. of Occasional Papers, for *pointing* read *pinning*.

ON IRON AS A BUILDING MATERIAL.

By G. Aitchison, Fellow.

Read at the Ordinary General Meeting of the Royal Institute of British Architects, February 29, 1864.

I propose to treat of iron as a building material, but the limits of this paper will only allow me to touch very slightly on the different considerations connected with its use; for to thoroughly exhaust the question would be to give a complete treatise on Architecture, considered as a science and as an art.

Within the last half century, the use of iron has become so general that it has nearly usurped the place of every other material. In every construction, machine, tool, implement, or article of domestic use we turn to, we find iron doing duty not unfrequently in the most unexpected ways and places. If we require permanence and durability, as in a bridge, we have iron; if we want lightness, as in a shed, we have iron; we have iron ships, iron churches, iron huts, and shall soon have iron forts. Our wharf walls are iron, our umbrella sticks, our shirt collars,—and, should we be unfortunate enough to require a surgical operation, we are operated on with an iron knife and sewed up with an iron thread. Whether we want to imitate the touch of the human hand, the delicate fragility of the teazle, or to resist the greatest force of artillery, we use iron.

Being, then, in the very middle of this "iron age," surrounded by iron, perhaps partially encased in it, with our very spectacles of iron, how is it that we can so shut our eyes to the great advantages it offers? Why should architects alone refuse to profit by it, or, when they are absolutely obliged to use it, give it a sort of grumbling recognition and put it out of sight. There are many who have used it with success, but by the profession generally it is avoided. What is the cause of this? Are architects really unconscious of this material ready to their hand, crying out to be loosed from the spell of ugliness under which it lies? Is our profession the only one which is standing still while every other is rushing on with unparalleled swiftness? If not, how can we account for this strange supineness in not seizing on iron with avidity, and creating an iron architecture? I think the cause may be traced to our education and our want of education. The architectural education we have received has succeeded in making us good, tractable, humble scholars; never thinking but as we have been taught, and handing down our traditions from one generation to another, and reduced to such intellectual bondage that we never dare hope that we can equal the architectural works of any preceding age. At one time it was said, "You cannot equal the architecture of the ancient Romans; perhaps you may imitate it," as schoolboys imitate Virgil in their verses, and shew their skill by tagging a line with a piece of his pure latinity, so we tried to give an architectural flavour to a plain brick house by adding a real imitation Roman Doric portico in stone or plaster. Then it was said that we could not equal Greek architecture, but we might imitate it. Horace was quoted to us, and we were begged to study Greek examples by day and night; now it is the Italian, the Byzantine, the Norman, and the architecture of the 13th century which is recommended for our imitation. What little information we might have gained of the strength of a lintel or a column was hidden by a mysterious scale of minutes and modules. While we have been laboriously pursuing the study of the particular mouldings, ornaments, and fashions which distinguished different epochs, we have had no time to bestow on learning mathematics, statics, and the strength of materials; besides, "all that sort of mechanical knowledge" was considered as "rather beneath an architect." It was for builders, clerks of the works, and carpenters to study such things. If an architect ever wanted such knowledge, he could readily hire some one who had it, or pick it up when he got into practice." Besides, as we were bound to imitate something that had been done before, it was useless to know the strength of any material; we dared not alter the shape nor proportions of our copy; we dared not attempt new ornaments,—to what end, then, should we aspire to be really architects? Brick, timber, and stone buildings had been executed for so many years that every difficulty had been solved. But when we used iron, we had few examples to consult, and were all in the dark. It was generally too costly to give it the form of stone. It was subject to sudden and mysterious failure. It could be cast, it is true, to almost any form we wanted, but the founder told us that such a form would tear in cooling, or the ornaments could not be done, or that where we wanted it to be hollow it must be solid, or when we wanted it solid it must be hollow; in short, it involved study, thought, trouble and risk, and even then it could not be made to properly resemble anything that our great masters had done. It appears, then, that iron differs in this respect from other materials; that we must have some slight acquaintance with the laws by which it is governed before we can use it properly or safely; while with the latter long-used materials we have only to remember or repeat.

The chief reason I have for reading this paper is, the hope of inducing the profession generally to turn more of their attention to this material, so that many if not all the obstacles that prevent its use may be removed, and the difficulties that surround it overcome.

To appreciate its value as a building material, we must compare it with those materials whose place it is about to supply, for we cannot judge of its capabilities until we know in what relation it stands to them.

The materials generally used for building are stone, brick, or timber; and we must know their relative strength, bulk and cost, their comparative durability or resistance to the ordinary and extraordinary forces of nature, before we can see how their place is to be supplied. In the first place, we want to know their comparative strength, and for this purpose we have only to know their ultimate crushing and tearing strength.

TABLE OF RESISTANCE OF MATERIALS TO A CRUSHING OR TEARING FORCE.

	WEIGHT PER FT. CUBE. In lbs.	TEARING SQUARE INCH. In Tons.	CRUSHING SQUARE INCH. In Tons.	SHEAR SQUARE INCH. Tons.	CROSS STRAIN SQUARE INCH. Tons.
Cast Iron	450	7	50	12	3·4
Wrought Iron	480	20	20 *	20	...
Portland Stone	134	0·4 *	1·5	...	...
Granite, Aberdeen	164	0·35 *	5	...	...
Brickwork in Cement .	117	0·034	0·23	...	·00156
Fir, Memel Dry.........	40	with grain 6 across do. 0·3	3	3	·50
Oak, English............	52	with grain 5 across do. 1·05	4·5	4·5	·75

Those marked thus * are doubtful.

COMPARATIVE STRENGTH OF CAST IRON.

CRUSHING.	TEARING.
2½ times as strong as Wrought Iron	⅓ the strength of Wrought Iron
33 „ „ Portland Stone	17 times as strong as Portland Stone
10 „ „ Aberdeen Granite	20 „ „ Aberdeen Granite
217 „ „ Brickwork in Cement	206 „ „ Brickwork in Cement
17 „ „ Fir	1·16 „ „ Fir
11 „ „ Oak	1·4 „ „ Oak

COMPARATIVE STRENGTH OF WROUGHT IRON.

CRUSHING.		TEARING.	
⅔ the strength of	Cast Iron	3 times as strong as	Cast Iron
13⅓ times as strong as	Portland Stone	50 ,, ,,	Portland Stone
4 ,, ,,	Granite	57 ,, ,,	Granite
87 ,, ,,	Brickwork in Cement	588 ,, ,,	Brickwork in Cement
7 ,, ,,	Fir	3⅓ ,, ,,	Fir
4⅓ ,, ,,	Oak	4 ,, ,,	Oak

By these tables, it will be seen how much stronger cast-iron is in compression, and wrought-iron in tension, than any of the other materials; but the advantage we should gain by substituting wrought and cast iron for them is greatly increased by the facilities they offer for using the material in the position where it is able to exert its full force. In one of the diagrams a solid wood beam is shewn; we see by the table that the ultimate compressive strength of fir is 3 tons to the inch, and the ultimate tensile strength 6 tons, whereas its co-efficient in cross strain is only 10 cwt., or 1-6th of its least capability. The reason of this apparent anomaly is, that the resistance of fir to being torn across the grain is 1-20th part of its resistance to being torn with the grain. The parts mainly resisting compression and tension are at the top and bottom, like the flanges of a girder, and the remaining substance is required for transmitting the strain to the bearings. Could the stuff be so arranged that the strength of the wood could act most advantageously, a girder might be formed of the same length and depth and twice the width, that would bear, instead of 29, about 77 tons; and if we made a girder with the same stuff 3 feet deep and the same width, it would carry 244 tons. This, however, cannot be done with wood; wood chips are useless, and we cannot build a girder, on account of the narrowness of the stuff, its weakness when in compression or tension across the grain, and the difficulty of properly connecting the parts. To obtain depth, we must make use of an open-braced girder, as shewn. The breaking weight of this girder might be greatly increased by using iron shoes and pins, and by carrying the ends of the braces above and below the flanges, but the utmost weight we could safely put on this would be nine tons. Fir will indent with half a ton to the inch, and the pins will tear out. In iron girders, whether cast or wrought, we can so place the material as to act with the greatest efficiency. Girders of cast iron can be made from twenty to thirty feet long, and have the flanges at least duly proportioned, the waste of material being generally confined to the web, which has to be made of greater thickness than is required to prevent tearing from unequal cooling; with wrought iron we can construct girders of almost any length we require, the web may be made of the exact thickness required, stiffened where it is wanted, and thoroughly connected with the flanges by riveting. There is an absurd prejudice against riveting or bolting; the newspapers were full of complaints and warnings about the danger of this manner of connexion in one of the new bridges, but when the resistance of any material to any particular force is well ascertained, and is properly proportioned to the strain, no greater security can be offered; the shearing strength of wrought iron is better known than its power to resist crushing; in short, we have more accurate information as to the strength of iron than of any other material, and it is as reasonable to object to the use of pins, bolts or rivets, because they may possibly shear, as to the use of a stone or brick pier, because it may crush, or to a king post because it may tear.

The strength of iron in flexure may be advantageously compared with that of brick, stone, or timber. Iron can be cast hollow or made up in such a form as to employ the material in the most advantageous way, whereas the other materials must be used in a solid form; and although for the purpose of comparison of bulk with equal strength (breaking weight 444 tons) I have shewn a solid iron column with the brick pier, yet in practice, a hollow column would have been used, one 12-in. in diameter and of 1-in. metal would have occupied less than a square foot, have had 34½ instead of 50 in. of metal, with a breaking weight of 1000 tons. Iron cannot be advantageously compared with timber for girders and posts, where moderate weights and moderate lengths only are required, except on account of its being incombustible, and not so subject to decay; but it can be very advantageously compared with brick or stone work, both for bulk, weight and cost, and as it will take almost any form we please it is so much more convenient. It can also be put together so readily that an iron building might be erected in half the time required for one built with the ordinary materials.

As a material for the construction of houses, iron offers the inestimable advantage of being incombustible, could we then eliminate the woodwork, we should not only be saved the annual expense of insurance against fire, but relieve our minds from the unpleasant thought of being burnt to death. I believe that some kind of incombustible fibrous slab might be used as wall linings, but as yet we have no substitute for flooring boards; though cast iron is incombustible, it is not fire-proof, it shares this disadvantage with wood, stone and brickwork in cement, in short there is nothing absolutely fire proof but bricks and mortar. In churches, houses and workshops, if the roof, walls and floors are made incombustible, the damage to the structure from the mere burning of furniture is small, and it is only in warehouses, where large masses of highly combustible substances are stowed, that the necessity for a perfectly fire-proof material is felt. Cast iron has hitherto been used for supports, on account of the saving effected in space, and although wrought iron is fire-proof, yet from its liability to bend when red hot, we have not had sufficient experience to know whether any great advantage would be gained by using it. It appears to me that by using a shield of thin wrought iron at some distance from the cast iron column through which the air could freely pass, or by filling in the space with plaster of Paris or powdered charcoal, we might probably prevent the melting or breaking of cast iron supports, and no doubt, as we get more experience, we shall be able to get wrought iron stanchions and girders made in such a way as to have sufficient strength to prevent them from twisting or crumpling up when heated red hot.

One of the objections to the use of iron is its rapid oxydation when exposed to the weather, this rusting is not only offensive to the eye, but where thin wrought iron plates are used, would rapidly destroy them, and we have consequently to paint the exposed surfaces. But why could not cast and wrought iron work be covered with glass or porcelain enamel? we might then have the external iron work thoroughly protected from the weather, and ornamented in gold and colour.

Another objection to the use of iron, though perhaps less than the former, is the large amount of contraction and expansion caused by the change of temperature; when iron is fixed in conjunction with other materials not so much affected by the change of temperature as with brick or stonework, the walls are pushed out of the upright, and the adjacent parts are displaced, the joints of coverings and gutters open or tear, and allow the wet to enter; and should any water find its way between bearing surfaces or into hollow places from which it cannot escape, it freezes in the winter, the bolts are torn off, and the casting broken; to avoid these inconveniences, great care and attention only are required in so arranging the work that the joints are well covered, that due space is left for expansion and contraction, and that the ironwork is not too firmly attached to materials that are not so much affected by heat and cold. The use of iron is rather objectionable in buildings where the highest degree of comfort is sought for, on account of its coldness to the touch in winter; and in very damp and misty weather the vapour condenses on it, and the wet will in some cases run down columns and form small pools of water on the floor, or drop from the points or sharp edges of girders. I do not think that it is much worse in this respect than painted plaster on walls, but it is a defect to which I thought it right to draw your attention.

There is great difficulty in getting the ornament on cast iron executed with sufficient sharpness when it is to be seen close, and of getting sufficient effect when it is to be seen at a distance. Although pierced work may be readily cast when it is applied to flat surfaces, yet any part that is undercut presents great difficulties, is very expensive, and is very apt to be badly done. Unless small ornaments, whether sunk or raised, are made a considerable distance apart, the sand gets broken down and the parts run together. When pierced work is used in the web of girders, where the bottom flange contains much metal, it is most difficult to arrange. If the flange is made wide it looks unsightly, and if narrow the bulk is so great, as compared with the web, that it is apt to separate. The ornament has also to be arranged in such a way that its parts may act as braces to bring the two flanges into play, and as the tensile strength of cast iron is small, these parts have to be large toward the end of the girder, and should they be so designed as to prevent the strains being properly conveyed to the bearings, failure inevitably takes place. The lugs by which the parts are connected require great study and contrivance to prevent them from being so unsightly as to spoil the whole effect, and the bolt heads and nuts if made ornamental are very expensive, and if the common bolts and nuts are used they give a coarse and unfinished look to the work. But the crowning difficulty lies in ornamenting columns. Horizontal flutings may be made with ease, but any kind of vertical fluting or ornaments are cast with the greatest difficulty, and foliage in high relief cannot be executed; the difficulty has hitherto been solved by having the capitals plain, ornamented in very low relief, or by screwing on pewter ornaments. No one can desire to see the capitals of columns ornamented with artificial flowers, pinned on like those in a lady's bonnet; but the difficulty of introducing any ornament that shall be effective at a distance is very great. We know that the strength of a column is greatly increased by having a flat disc at the top and bottom, but even were this not the case it is almost always necessary for the purpose of connection with the work borne, and consequently the capitals and bases cannot be cast separately and dropped on. The plan I have generally adopted has been to cast projections, and on these to hang openwork veils, or to cast the cap in pieces and bolt it together. I have mentioned this, as on first designing ornamental ironwork we are apt to think of the undercutting in fenders and grates, and the excellence with which the ornamental parts are executed; but as a great number of them are cast from the same pattern, it is generally made of brass or metal, the undercut parts in small sections, and then these are picked out piecemeal from the sand, the expense altogether preventing such means being employed where a few castings only are to be made from the same pattern, and being in my opinion wrong in principle. I would recommend the Queen's gold medal being offered by the Institute to any one who could design an effective cast iron capital that could be readily and cheaply cast.

Wrought iron has hitherto been left plain, no attempt has been made to ornament it on account of the expense of working or cutting it, and so long as architects use wood, stone, or plaster, to cover up their girders, columns, &c., when they wish to make them ornamental, and the public are indifferent whether they are ugly or not, very little can be done, unless some cheap means of enamelling can be applied; although they might be readily ornamented by having patterns punched in the web and by notching the edges.

In a large city like London, certain portions about the markets, or which form centres of particular occupations, are more and more sought for, as the population multiplies and trade increases. The land on which the houses stand rapidly rises in value, as a greater number are anxious to share in the advantages which such particular sites offer; accommodation is partly obtained by the absorption of the adjacent houses for the purpose of the peculiar trade; still the greater the absorption the less advantage is offered, as one of the main objects is the saving of time in the distance to be traversed from the market to the shop or counting-house, or from one man's shop to another.

Rent has to be paid for the use of the land, whether profitably occupied or not, consequently the saving of space is an object that should engage our utmost attention, this is partly effected by throwing small buildings into large ones by which a saving is effected in the space unprofitably occupied. What I mean by the space unprofitably occupied is that given up for walls, partitions, staircases, and as areas for light. Supposing that land in the centre of the trading part of London is worth only £5. a foot, although in some cases it is worth £30. a foot, then each foot converted from unprofitable into profitable space would, at 5 per cent. save only 5*s*. per annum; but as each foot of land has at least four profitable stories over it, we should gain probably five times that amount in rent, besides the incidental saving in time, shoe leather, wear and tear of the body and irritation of the mind. So that I might not overstate the case I have taken, as an example, a house I have lately built in the heart of the City, about 16 feet wide, 27 feet deep, and 51 feet high from the pavement to the top of the coping, its area is 426 feet, and the space occupied by the walls about 93 feet, or rather more than 1-5th of the whole area; we might construct these walls of iron only 4 inches thick, or reduce the unprofitable space from 1-5th to 1-21st part of the whole area, by which we should effect a saving of about £90. a year in the rack-rent, supposing that the iron could be executed at the same cost as brick or stone. The house is lit by a narrow street in front and by an area at the back. One of the usual disadvantages of city houses is the want of day-light, and this light can only be obtained by enlarging the windows. I have shown in the diagram a brick front with the ground floor all window, the first and second floors with windows 8 feet wide and 9 feet high, and one 8 feet wide and 6 feet high for the top story, windows larger than would be used: the area of void is not one-half, while in the actual back front, which consists of iron girders and columns, the void is nearly 3-4ths of the whole area, or the gain is 218 feet of light.

It has lately been pointed out to us that we are recklessly extravagant of the coal which we possess, by burning it in such a way, as only to consume a small portion of it, wasting its heat and filling the air with soot. By using the hollow iron party walls as flues, we should not only be able to warm our rooms better, and at less expense, but be saved the annoyance and waste of time of attending to fires, and, possibly save the cost of insurance.

I have hitherto spoken only of houses used for the purpose of business, to which little damage can be caused by fire if the main structure of the building is wholly incombustible, but in warehouses, where large masses of highly combustible substances are stored, the question of the saving of space has to be set against the risk of fire. In this class of buildings, as I before mentioned, economy of space has caused the use of iron for supports, and the walls, generally bear a much smaller proportion to the whole space than in houses, and have to resist a lateral pressure, as well as to protect from fire. Whether we could find some material to fill in between iron walls that would not conduct heat, or whether a free current of air would answer the purpose, I will not attempt to decide; but, at present, I could not advocate the use of iron party walls in warehouses.

Having now pointed out how we gain in space, in security from fire and in lightness, over the former methods of construction, I must say a few words on the general adoption of iron buildings. The public are getting more informed on the subject, and now very generally insist on the use of iron in buildings, for the purpose of gaining space and light—even basements are rarely vaulted without iron being used, to prevent the loss of space in the rise of the arches and the thickness of the vaults—and as soon as they are aware that architects merely use the old materials because they will take the ancient forms, they will refuse to allow valuable space to be occupied, and light to be excluded, because architects wish to exhibit this or that style which originated in the necessity of excluding the light and heat. So greatly has iron intruded itself, even on our profession, that one rarely sees a large building being erected without iron columns and iron girders: if, then, these are introduced, what excuse can be made that the work is not logically carried out, and iron adopted in every part where it can be successfully applied? It is only because proper attention has not yet been given by architects to the material. It is in vain to say that it is because of its liability to decay, for if it is introduced in columns and girders, the decay of these will as soon ruin the building as if the whole were constructed of it, and whether the profession choose to frankly accept it or not, I feel assured that it will come, sooner or later, into general use, and it is better for us to yield with a good grace to inevitable necessity, than to be gradually superseded or forced to use it by those whose judgment we consider inferior to our own.

If any architect of this day has any new and beautiful conception that he wishes to hand down to remote generations, by all means let him employ brick, or brick and stone exclusively; let him vault his floors and roof, if he can get the space required for the abutments, and the cost of the additional height; but to those who are engaged in works of more immediate utility, and whose ideas are not of such transcendent merit, I would recommend the use of iron, and to use it properly it must be studied, and the study of it will be found most absorbing and fascinating, and quite as much care and foresight will be required as for any material that has yet been used.

Having now pointed out the advantages that iron offers, and the main difficulties that have to be conquered, I would call your attention to its adaptation for the NEW STYLE, about which so much has been said, during the last few years, and so little has been done. It is, doubtless, true that the English nation is not one of the great artistic nations that have, from time to time, come forward with a new style, or a new adaptation of an old one. Although we have equalled the best in our literature, and surpassed them in our mechanical inventions, it appears that we have never led the way in pure art, yet there is a certain amount of artistic invention amongst us, and if this were turned in the right direction, we should certainly produce something original, and possibly something good.

I cannot say whether the general want of appreciation of beauty is a natural defect or merely the legacy left by former generations, who not only did not care for beauty, but even endeavoured to destroy all natural admiration of it, or, at least, to repress such a feeling as a suggestion of the evil one, but towards the end of the last century all real artistic invention seemed to have completely died out. At present there is a great stir about the Arts, but when we look around us—beyond the very small circle who are engaged in them—we not only see everything hideous, and every one contented with it, but we trace a sort of process by which everything that is beautiful and picturesque is gradually but surely, being extinguished—the labours of the field are performed by hideous engines; the commonest household services are being done by machinery. The moors, heaths, commons and forests make way for fields of cabbages, mangel wurzel and potatoes—trees and hedges will shortly be extirpated. All splendour in dress is laid aside, and we may expect to see the materials of clothing so improved and cheapened, that the labourer in his best clothes, and the king on the throne, shall be almost undistinguishable. Processions and Civic pomp are doomed; warfare itself is becoming as unpicturesque as civil life, and our future navies, if seen at all above water, promise rather to remind us of the porpoise than of the nautilus. Sculpture and painting have ceased to have any marked influence on mankind, and only put up a sort of protest in favour of beauty, but which, for the most part, must be clothed in the forms of past ages, or other countries, to make it palatable. Although this may not be the time for art, yet I think that, as gracefulness of form, and beauty of colour, pervade the greater part of Nature's works, we may *still* endeavour to render buildings agreeable to the eye. It must, however, strike the most unobservant that ornament is looked on either as an advertisement, or as a humouring of the prejudices of the vulgar: and every part that is supposed to be hidden from the public eye is not only left bare of ornament, but is made without regard to anything but convenience; still, looking at our civilisation and our tastes, I think a purity of outline and elegance of proportion, with an almost total absence of ornament might gradually be made to pervade everything, from our buildings to our tea spoons.

Whether the age is distinguished for its powers of artistic invention and good taste, or whether it is destitute of them, is a question on which there may be different opinions, but can any one who has thought on the subject believe in the propriety of dressing up the buildings of the present day in the architectural forms and ornaments of former times? If architectural art is anything, it must not only make the required forms beautiful, but of that form of beauty which the taste of the age finds most suited to it. This may be said of every art, but the conditions of architectural art force this truth upon us. A Protestant church of this age has very different requirements from a church of the middle ages. We do not want it for processions, but for hearing the service. The tower no longer is wanted for beacons, nor does the sound of the great bell call the parishioners to arms, and bell-ringing is no longer a general pastime. Even greater alterations have taken place in the requirements of other public and private edifices. New materials and new methods of construction are introduced, so that the forms which former ages used can no longer be adopted with propriety, even though the ceaseless craving of the mind after novelty did not demand an alteration.

We admire the exquisite art of the Greek temples; but they only excite our contempt and ridicule when executed here in the present day; and, although the copies or paraphrases of building in the later styles may be less sublimely ridiculous, they produce in our minds an exactly opposite effect to the originals. In the originals we see an expression of the thought, and taste of the period; in the copies we only see the want of both. If we were asked whether a people who had discovered twenty new sciences, who were quiet, orderly and peaceful, averse to outward show, with a peculiar literature, rather unbelieving than bigoted, the bulk of whose work was done by complicated machinery, worked by steam and electricity, would adopt the architecture of an age in which science was in its infancy, whose people were turbulent and quarrelsome, in whom the love of war was a predominant passion, almost devoid of literature, passionately fond of outward show and personal adornments, who wore armour, and in whom personal prowess was one of the greatest virtues, credulous as children, bigoted, cruel, with a few simple machines and instruments, and who knew of no powers but those of the wind, water, and animal strength, should we not indignantly reject the idea? But such unfortunately is the case, and archæology has usurped the place of architecture. At first sight this may appear a matter of small moment, but, in reality, it cuts at the very root of true architecture, and has made it a mystery of which only the initiated can judge. It has disgusted the bulk of the people, who take the same interest in it that they do in heraldry; it has crippled the natural powers of the architect by throwing his energies into a wrong direction, forcing him to waste his time in learning what other men have done in other countries and other ages, and leaving him helpless to deal with new forms and new materials in this, and far behind in the rapid progress of new methods of construction—the great body of the people have treated him as a trifler and a pedant talking a language they did not understand, and a new race of architects have sprung up, who, pushing him rudely aside, have thrown art and beauty to the winds; and under the name of engineers, and the protection of science, have carried construction in the new materials to a point of marvellous excellence, and have filled the world with abominations of ugliness.

So long as we profess to be architects, so long do we profess that we are able to give beauty to the necessary forms that new wants, new adaptations, or new materials require, but so long as the present engineering monstrosities cover the town and country, we confess that we cannot substantiate our pretensions. I do not wish to be misunderstood. I do not deny that we could put the ugly construction into an ornamental box, or, leaving its hideous outline, ornament it with triglyphs or cusps, but we cannot make the thing itself graceful or elegant. The Greeks clothed their rude construction with a beauty we still admire. The architects of the 13th century not only made a revolution in the art of construction, but threw their new construction into new forms, and covered it with new ornaments; and not only succeeded with their chief buildings and cathedrals, but made even their military works picturesque; and the admirers of that style praise the beauty of their bridges, their parish churches, their private dwellings, and their domestic furniture.

Has then the human mind deteriorated, and are we incapable of making our new constructions beautiful or picturesque? Is the saying of Victor Hugo true, that printing has killed architecture? I trust not; our engineering works and our mechanical inventions shew us that in these respects we can rival the middle ages, and I fervently hope that we may find that it is only through a sort of infatuated perversity that we are now so wanting in artistic invention. The conservatism of mankind is so great that it is only at certain periods of intellectual convulsion that men will dare to doubt and think. Doubting is the first great intellectual virtue, which apparently few architects have reached. The happy invention of Palladio has given us a dispensation from thinking. The sculptor architects of Italy had admired the fragments of antique sculpture that were continually being found, and had endeavoured to transfer some of that elegance and grace into their buildings, but it struck Palladio that if so much grace was given to buildings by a little study of the antique, how beautiful they must be if they were copies. The same happy induction as that of the Irishman, who made his apple tarts all quinces. From that time architecture has been blighted by a servile desire of imitation; we have tried Egyptian, Greek, Roman, Byzantine, Romanesque, Gothic of all periods, Italian and French Renaissance, revived Roman, Arabic, Chinese, and other styles. Let us now throw aside all our old traditions; let us hold in abomination the five orders, coronas, triglyphs, curled cantalivers, the egg and tongue, and the acanthus-cusps, crockets, and the pointed arch; and if we have no taste or artistic invention, let us boldly confess it, and be proud of saying—"An ill-favored thing, Sir, but mine own."

Mr. William White (Fellow) had much pleasure in proposing a vote of thanks to Mr. Aitchison for his paper, although there were many points he had brought forward with which he could not coincide. Nevertheless, the whole matter of cast and wrought iron had been placed before them in a thorough and, as he thought, impartial manner. Mr. Aitchison had shown them the necessity for a different treatment of cast-iron from that of wrought-iron, and the necessity for different manipulations for each; as also the superior strength of iron over every other material. All this he had duly pointed out; but he did not think that the application he had made of this material would in all respects commend itself to the general feeling of the great body of architects, for this reason: Of course iron must be looked upon, as it always had been, as one of the many materials to be used in building; but if he understood Mr. Aitchison aright, he proposed it as a material which was to a great extent to supersede the use of almost all other materials in building. As regarded the construction of a great many buildings where vast size, lightness, and strength combined were required, there could be no doubt iron must always enter very largely into the material for such buildings. Nevertheless, he thought Mr. Aitchison had plainly shown them, on the other hand, that in that especial branch of building which was in its true and proper and highest sense "architectural," iron was unsuited. ("No, no.") He expected to hear "No, no;" but he thought Mr. Aitchison had not yet shown them that for every purpose of ordinary domestic use—and for every purpose for which the great majority of buildings were erected—that iron could be the most available or most comfortable and useful when employed, or that it was the least expensive material. He had walked through London, and he had not yet seen those numerous iron buildings arising in every street which they were led to expect from the promises of fifteen or twenty years ago from the development of iron architecturally. It was a matter to which he had given considerable attention. He had spent days, even weeks, at the forge and the foundry with practical men, and on some of these points he entertained strong opinions. Towards ten years ago, he had to put up a small private school chapel, and after hearing very learned disquisitions on the treatment of iron-work as to supersede everything else, he asked the gentleman who advocated iron to furnish the lowest estimate at which he could put up a building, fitted for the purpose and of the size required. It was not a large structure in which great space and light were required, but only a small place, where a few people could meet together with warmth, comfort, and some pretensions to architectural appearance,—and the lowest estimate for producing the very simplest effect in iron was between twice and three times its actual cost in brick and stone. He must put out of sight that desirable—not to say essential—architectural appearance for some time. They were told that architectural appearance was to come; but Mr. Aitchison had shown that, so far as the present was concerned, the nature of wrought and cast iron was such that it was not fitted for daily use, but only for large buildings or for buildings which required great reduplication. At present, he did not think they saw their way to putting up exterior walls of iron, and he had carefully listened, in the expectation of hearing mentioned some substitute which should be satisfactory for that purpose. It was true, the two casings of iron wall filled in as proposed would, to a certain extent, keep out the changes of atmosphere, but not at all perfectly. It might be more effectual in changes of temperature; but these affected the atmosphere more with iron than with other material. The great and rapid condensation of vapour alluded to in the paper might to some extent be got over, but he did not think they could well have the outside face of the walls cased with iron, which must be protected either by an anti-corrosive process or by enamelling; nor did he think it would be comfortable or even healthy to do so. He had conversed with many medical men on the subject, and they had generally endorsed his opinion that the porous nature of brick and stone was one of the greatest advantages in buildings in a sanitary point of view. In a little book which most present had probably read—"Miss Nightingale's Notes on Nursing"—it was stated that the use of glazed tiles inside and outside the building was a preventive against infection in epidemic diseases, the retention of unpleasant odours, miasma, and so forth, from being in no degree porous, and so being less absorbent of infectious vapour and more easily wiped and cleaned. Whereas, in truth, absorbence was in one respect a great safeguard; if every particle were left volatile, clothes and persons would be more readily susceptible of ill effects; and the walls acted, as it were, as a filterer to the house. Then, again, as to the alternative of exaggerated spaces for windows, as shown on the exhibited drawings in lieu of wall space: that amount of window space required an amount of glass, which was equally liable to the objection he had spoken of with regard to the changes of atmosphere and temperature, which might render a building untenantable for domestic purposes.

The **President** (Professor **Donaldson**) remarked that the application of iron had been recommended only in buildings for commercial purposes in confined localities—not for family residences, as he understood the paper.

Mr. **Aitchison**, Fellow, did not suppose that iron would be used in the way he had pointed out, where space was not a consideration.

Mr. **White** said, if iron was to be used only for warehouse purposes, his remarks fell to the ground; but in other parts of the paper he thought that was not the exclusive application of Mr. Aitchison's remarks; else all those remarks relating to domestic and religious buildings, and the new school of architecture, would have been superfluous. As regarded his remarks upon the use of iron as calculated to give rise to a new school of architecture, he thought many members present would hardly fall in with what had been advanced on that subject; for the very nature of architecture, and all the ideas which had hitherto prevailed throughout the world, had been based on super-position. The materials of stone and brick were the only ones that were available for every village domestic use by the great majority of English workmen. Of course these applications of iron might be prepared in foundries, sent out, and put up; but he did not think it was in the nature of things that the ordinary forms of construction in architecture would be superseded by the material which Mr. Aitchison advocated. As to his remarks upon religious architecture, he hardly thought that part of his subject relevant to the matter in hand; and for that reason he should not offer some observations which he contemplated doing when he first listened to the remarks of the paper. He begged to propose a vote of thanks to Mr. Aitchison.

Mr. BAKER, Associate, requested Mr. Aitchison to explain the section of the ⅄ girder, as he had stated there was great difficulty in casting undercut work. From the drawing exhibited there appeared to be an immense amount undercut, and it was nevertheless apparently quite a practical piece of work.

Mr. AITCHISON (referring to the drawing of the ⅄ girder) said it was a form of girder which was used by his father nearly twenty years ago in, he believed, the first incombustible building of iron and brick that was put up in London.[*] It was then considered a very effective girder, and he believed had been previously used; but since that time more was known about girders, and it was now found to be a very bad form, irrespective of the difficulty of casting, as a great proportion of the metal was put in a position where it was almost ineffective. This girder was known as the Y or skew-back girder, and by putting the metal of one side of the ⅄ into the bottom flange, it would act with the whole depth of the girder, instead of being applied comparatively near to the neutral axis. The difficulties in the casting were so great, that the founders frequently undertook to make the girder deeper, and to put in a larger quantity of metal, if they were allowed to omit the top flange, so that it might be cast bottom upwards when the pattern would draw. He added that this form of girder was now almost totally exploded, and was never used except under particular circumstances where it was found convenient to do so.

Mr. MORRIS, Associate, concurred in the statement just made, that this form of girder was not much introduced in practice; at the same time, it possessed extreme strength of body to resist tension.

The PRESIDENT remarked, that of course if they wanted to give additional strength they would increase the bottom flange; the shape adopted was for the purpose of giving a skew back.

Mr. J. W. PAPWORTH, Fellow, would inquire why a Y girder was necessary, when a simpler section (such as he described on the board) would answer all the purposes required? that was adopted when he was a boy, and he had never known it fail. He had great pleasure in seconding the vote of thanks to Mr. Aitchison, although he was entirely opposed to the views expressed by the proposer of the motion; and was proceeding with the expression of his own sentiments upon the paper, when, in accordance with the request of several members, the PRESIDENT announced that the discussion of this paper would be resumed at a future meeting.

Mr. KERR expressed a hope that some of the ornamental drawings by which the paper was illustrated would accompany the publication of the paper in the "Transactions."

The PRESIDENT said, that Mr. Aitchison would place the drawings at the disposal of the Institute for that purpose, and they would be selected and reduced to a practical size for printing with the paper.

The meeting then adjourned.

---

[*] Irongate Wharf.

THE SKY-LINE IN MODERN DOMESTIC BUILDINGS.

By A. J. B. Beresford-Hope, F.S.A., Hon. Fellow.

Read at the Ordinary General Meeting of the Royal Institute of British Architects, March 14th, 1864.

There is no one here present, I should imagine, who has not often found himself gazing at the river front of Somerset House, as he whirls in a Hansom over Waterloo Bridge. With what feelings each of us may have looked upon that famous building I cannot tell. Personally I must, with all deference to its eminent architect, say, that to my eye it offers an instructive combination of strength and weakness. As laid out within the four great straight lines of base and balustrade boundaries, the composition deserves the highest praise. But although those lines comprehend the entire area over which Sir William Chambers seems to have imagined that the art of the architect extended, they do not include essential portions of the building, which not only exist in actual construction, but which are powerfully conspicuous to the passer-by. I do not allude so much to the cupola designed to cap the centre, and on that account barely adequate, as the crowning mass of the entire river front, as I do to the mean looking roof, with its innumerable fantastic array of hideous chimney pots and chimney tubes. I anticipate the answer that will be made to these strictures. I shall be told, in the first place, that the chimney pots and tubes are no part of Sir William Chambers's own work; and, secondly, that when he built Somerset House he had no idea that it would be overlooked by a bridge in immediate proximity, and so that he contrived a parapet and a roof mutually intended to mask and to sculk in presence of the critics in the wherries; the point of view from the surface of the Thames itself being the one about which he was most concerned on that side. I readily accept this defence, because it concedes the position which I desire to occupy. Somerset House, by the confession of its warmest admirers, is not a structure built for all circumstances, nor to be seen under all points of view. Something, therefore, must have been wanting in the artistic repertory of its architect, which has so far made it defective. What that deficiency is will be the object of this paper to unravel.

But before we enter on the main question, let us for a few moments contemplate, as a strong contrast to Somerset House, another famous pile overhanging the river of a great capital, and the more so because the building, as I know it, is now a thing of the past, the Pavilion de Flore at the Tuilleries, which is being re-built, perhaps beautified, if so, more's the pity. The old Pavilion de Flore, of the style which intervened between the absolute Renaissance and that of the seventeenth century, was grey and grim, but very stately, rising over the Seine like a keep, with its steep self-vindicatory roof, and its solid tower-like chimneys. Criticise the Pavilion de Flore as you like, you feel that it was real, palatial and grand; the reason is, that the very points on which Somerset House is most weak, are the distinguishing characteristics of the Parisian structure. In one word, at the Pavilion de Flore the *sky-line* was foremost in the architect's mind—at Somerset House it was entirely overlooked.

In treating of the sky line in modern domestic buildings before this Institute, I shall regard the subject from an architectural rather than a merely picturesque point of view, not merely enquiring what forms of sky outline are most agreeable to the eye, but also pointing out what method of construction conduce to the creation of those forms. I have been induced to take up this subject from the pleasurable conviction, that out of the battle of styles has grown up on both sides a genuine desire to be real, and to make the most of, instead of masking and playing tricks with, all features of construction. I shall not wander into controversy by arguing which side gave the impulsion towards this reform. I accept it the more readily as it allows me to discuss the first principles of the domestic sky-line, from data which will equally be accepted by the classicist and the Gothicist. At the same time, the limits of a paper only allow me to skim the question, while many considerations of the highest interest, such as the influence of local scenery on local architecture, must remain unhandled. No doubt the general appreciation among architects of our own time, of the need of a true sky-line created by the building itself and not by any fantastic excrescences perched on the cornice, is but the revived perception of a truth of which, as we have seen, the architects of the Valois and the Bourbons realized as keenly as those of St. Louis; but it is one which had been so much forgotten in England under the influence in our towns of architects of the Chambers and Adams school, and in presence of the numberless builder-built country houses, whose stuccoed hideousness deforms some of our fairest parks, that I claim for its revival the merit almost of a promulgation of a new truth. I disclaim any imputation of irreverence when I say that this principle is most aptly prefigured by the Apostolic illustration "and to our uncomely parts we give the more abundant comeliness." The precisionist school seems to have arbitrarily assumed that certain portions of a building, the roof that carried off the water and lodged the domestics, and the chimneys that carried off the smoke, from the presumedly menial functions which they fulfilled in the economy of the mansion, were and ought always to remain uncomely; so the roof was kept low and almost out of sight, and the cornice or balustrade tilted up before it, with just room for the open intervening gutter, in noble disregard of the damp, the smells, and the darkness thereby inflicted on the persons whose ill luck compelled them to sleep there; and the architect stopped his chimneys short at a tiny distance above that low pitched roof, leaving it to the smoke-doctor to convert the neither beautiful nor useful thing, which he did not blush to call chimney, into something else still less beautiful, but more useful, which might in some degree do that for which chimneys were originally invented—carry off the smoke.

The older architect, appreciating, by reason or by instinct, that as in God's architecture of the mountain and the forest, the peaks and the tree tops, standing against the sky, give character to the entire landscape, so in man's architecture the sky-line must be studied if the structure is intended to be complete and successful. What if the uses of the upper parts of the house are not so dignified as those of the lower floors, still they are needful, and it is with these that he has to make the sky-line, and therefore was more abundant comeliness given to the attic and the chimney, and together with their comeliness more thorough usefulness, inasmuch as the attic gained light and air and headway, while the conspicuous chimney proved equal to its appropriate office.

A short retrospect will show that I have not been unjust to our classical architects of the middle of the last century, in charging the neglect of the sky-line chiefly upon the influences of their teaching, too readily responded to by the ignorance and the cupidity of the builders. The attention which the Mediæval architects of England paid to their sky-line needs no proof. It is as visible in the castle as in the minster, at Carnarvon as at Lichfield. It is equally visible in the farm house and the oak-framed cottage. When the growth of civil organization consequent on the termination of the War of the Roses, and of the accession of the Tudor dynasty, had induced the smaller squire and the substantial yeoman to build for themselves larger and more durable mansions than their ancestors thought of occupying; then too the skill of the architects—most of them, it may be, obscure local men—seemed chiefly bent on giving an effective sky-line to the many-gabled hall or grange, whether of stone or of half-timbered construction. The vicious element in the Jacobean style, viewed in its mass and not in its details, was the insolent capriciousness with which it played with the sky-line, in many a fantastic gable. In turrets and in towers Jacobean was always clever, and often very graceful, and it ever made the sky-line its leading object.

When Inigo Jones, in the reign of Charles I, and Wren in that of Charles II, established for a time the supremacy of classical and Italian architecture, the newly fashionable style was handled with due regard to the sky-line. The finely broken façade of the Palace of Whitehall is evidence of Jones's regard for this essential feature. Wren's appreciation of the sky line stands confessed in the forest of London steeples, so marvellously diversified as a whole—each so ingeniously put together—all clustering round the central dome of the vast cathedral. It equally stands confessed in the curved outlines of Christchurch gateway, Oxford, in the massy tower of Warwick, and in the statue-capped library of Trinity College, Cambridge. To turn to the works of lesser men at the last years of the seventeenth and commencement of the eighteenth century, who can say that there is no feeling for the sky-line in those snug red-brick houses, with developed roofs and solid chimneys, of which we still see so many specimens basking at the outskirts of our quiet country towns, inside their walled and fruitful gardens!

If we study the grander buildings of the earlier eighteenth century, zeal for the sky-line assuredly inspired the palaces of Vanbrugh, Castle Howard and Blenheim, and the churches of Hawksmoor, such as St. Mary Woolnoth and St. George's in the East, which heavy though they may be called, are the genuine products of an original and masculine ability. It was, I say, reserved for the architects of the middle of the eighteenth century to deal with the roof and its accessories, as if it were something unclean. The reason of this caprice does not lie very far off. They moulded their style upon models procured from countries which were not in so much need of artificial warmth as we are, and in which chamber accommodation was more scantily provided, and they were unable to vary their specialties so as to accommodate those wants of their age and climate, which actually pressed upon them. Yet there stood in evidence against them, not the spires and the gables merely of our Mediæval towns, but the temples and the towns of old Greece and Rome. That the sky-line was deeply studied by the ancient architect in his public buildings needs not to be demonstrated. The Acropolis of Athens alone is proof enough, crowning the steep rock with its towered fortifications, and fronting the sky with the stately Propylæa, the spreading and irregular mass of the Erechtheum, and the gabled Parthenon, all clustered round the colossal image of Minerva Polias, rising like a Flemish Beffroi, at once the visible central point and the tutelary deity of the city. The Capitol, and Mount Palatine, bear equal evidence. But how about private houses? I assert that there is proof sufficient to show that in spite of the small size, the inconsiderable height, and what we should now-a-days consider the meanness of those habitations, they were, nevertheless, built upon a principle of sky-line based on the effects of roofs, sometimes low pitched and covered with tiles, and sometimes flatly covered, combined with variations of height in the houses themselves, produced by the irregular superposition of stories, so as to impress the whole composition with an effect analogous to that which would be given by a large distribution of low towers.

No Greek nor Roman architect—had the problem of the multiplied wants of European eighteenth century civilization, and the uncertainties of an English climate been set before him—would have solved it, as we have seen that it was solved, by our countrymen, in the much abused name of classical antiquity. Where the architects left off the builders came in, and under their handling that *ne plus ultra* of dismal featureless ugliness was reached; the stock respectable English street-house, with its oblong holes for windows, and nothing visible of the roof, besides some dumpy chimney pots and some broken-backed metallic tubes. Perhaps there is one thing even uglier, and that is, this same stock house, respectably beautified with stucco or white paint, pediments run in compo over the windows, and a menacing slice of cornice stuck on in front. Happily we may now laugh at these things with a safe conscience, for we are on the fair road to a better state of things, though far, very far, I fear, from having made sure of that salutary reform. Architects have, I believe, all accepted the right opinion; but the builders, too many of them, are still impenitent. Of course those architects whose style was Gothic or Elizabethan, were the first to give in their adhesion to the apparent roof. But within these few years we have witnessed the conversion of those who cultivate the Renaissance. Renaissance being still the favourite architecture for London streets, the appearance among us of the artistic sky-line has been of recent date, but happily it has appeared, not only in such big piles as new hotels, and so on, but in many shops, and in some private houses. Still, as I said, the builders are, naturally enough, slow to rise out of the trade ideas, which they are so readily able to manipulate, and thus avoid the expense and control of an architect. So it is, that not only do we see the old type re-producing itself like a contagion, street after street, but we are doomed to witness erected on the pleasant hills of Sydenham and Norwood, and elsewhere, groups upon groups of semi-detached villas, all constructed on one type, and that the most offensive conceivable, springing up in clusters to spoil neighbourhoods lately so beautiful. I appeal to all present whether it is not worth while to do something to check this continuously advancing wave of a bad taste, which is already discredited without being extinguished. With all submission, I contend that the most effectual antagonism is the creation of a popular feeling for that general perfection and grace of outline in buildings (apart from detail or material or colour) of which the sky-line is a very, if not the most, important element.

The first step towards constructing is, to analyse the materials ready to hand for construction. What then are the elements out of which a good sky line may be created in a moderately sized single or double house, in town or country, or in a row of street houses? elements all of them more or less applicable, *mutatis mutandis*, either to Gothic or Italian. I use the word elements in two correlative senses, as signifying both the architectural forms out of which sky-line can be built up, and also the material portions of the building to which those forms are applicable. First—as to the forms, speaking most generally, the elements of the sky line may be classed as tower, pyramid or cupola—tower including all forms which rise with parallel sides, and a summit line approaching to the horizontal; pyramid all that rise with converging straight, and cupola all that rise with converging unstraight, lines. But for the purpose of this enquiry we must sub-divide a little more minutely, bearing all along in mind that the forms of which we treat must, inasmuch as their effect on the sky line is our immediate question, be regarded as indifferently belonging to linear or solid geometry, and that we may now and then find correlative constructive features, linear and solid, respectively answering to the same form.

The necessity for this distinction, which I fully grant is at first sight open to the imputation of over-minuteness, will be manifest if we recollect in how different an aspect the sky-line of a building presents itself when we gaze upon it at noon day, with the sun's rays searching out each nook and cranny, every moulding and every corbel, and when we view it standing out against the twilight of the sun already set, itself one single mass of inky violet, with nothing distinguishable but the absolute outline seen, as it were, in one plane. Of course, a good sky line ought to please under both these conditions. In the first case, all the forms which are circular, or cubical, will strongly assert their solidity. In the second, they will appear to the eye as simply linear.

The tower, whether square, polygonal, or circular, sufficiently explains itself in the primitive meaning of the word; as a form of the sky-line it also includes the ordinary outline of most houses, a story of one or more rooms casually raised above the remaining building, and chimneys generally. The tall circular stalks of manufactories must also be classified as towers. The pyramid is either obtuse or acute, and to it belong all roofs of a single pitch, meeting at a central point. Spires are acute pyramids, and the ordinary pointed gable is a linear pyramid. Conical roofs are also pyramidal in their outlines, and must, by rights, be referred to this class, although in sun light they have, in spite of their vertical section, much of the effect of the cupola, from the prominence which is then given to their curved element. The truncated pyramid occurs of a low pitch in the roofs of many houses, and of steep pitch in those

French cappings which have recently been incorporated into English architecture. Sometimes the truncated pyramid is made with uneven sides, so as to give a ridge and not a flat surface at the top, and to produce the appearance of a very sharp spire on two sides. A truncated cone has not yet been introduced into architecture, and I trust never will be. The apsidal roof of a church viewed perfectly direct is of course a cone. The steeple composed of a series of receding cylindrical stages, like St. Bride's, Fleet Street, will probably be best included in this class, and also the pointed roofs with sides curving inwards. The seventeenth century gable of Holland is not unfrequently a section of the last-named form. The cupola, in its original signification, explains itself. Classified by plan, there are circular and polygonal, and by section oblong, hemispherical, and oval cupolas; not to talk of the Russian form of a cupola pinched in at the tambour and expanding upward like an onion or some other bulb, of which there are such notable examples at the Pavilion, Brighton. There is also the four-sided cupola found in French buildings of the seventeenth century—notably in the Tuilleries. The mansarde roof, composed of two stories of different angles, had best be classified as a cupola, for in a haze, and to a short sight (the criteria of ambiguous forms) it looks almost curved. The curvilinear gable, so familiar to us in Elizabethan houses is, of course, a section of a cupola, and by our rule comes into this class.

After these brief explanations, I come to the point of how to build or how to alter the average street-house of our towns, the smaller house of the country, and that peculiar suburban institution, the "semi-detached" couplet, so that they may, by means of their varied and graceful sky-line, be architectural ornaments, and not eye-sores to their localities. Form, and not colour, will be the exclusive staple of the enquiry, and so we shall not have to enter into the difficult discussion of the merits and demerits of polychromatic architecture. A few years since, before details had been as much studied as they happily are now-a-days, an attempt was prematurely made to adorn our suburbs, and the more genteel country neighbourhoods by what it was then the fashion to described as *cottages ornées*. But the extravagance of the woodwork nailed on to the gables, the flimsiness of construction which this meretricious show too often concealed, and the rustic narrowness of the windows (planned, I conclude, to be blocked with woodbine and eglantine) were effective and reasonable obstacles to the spread of a taste of which notable examples are still to be found in the outskirts of the metropolis, and in some well known watering places. The result was a retrogression of taste into the old typal forms; and so, while the highest and the lowest class of houses in the country have alike notably improved—because of the highest and the lowest class of houses, the squire or the clergyman is ordinarily the director, and the design comes from an architect's office—the intermediate grade, of which the builder is the designer and often the pay-master, remain at the old dead level.

A good sky-line may frequently be produced by the simple process of throwing up one or more rooms of the house one story, or sometimes two, higher than the remaining building, so as to compose a kind of tower; but in this case the roof of the lower portion ought never to gable *obtusely* parallel with the side of the tower, though if the house is in Gothic, an acute gable will not be displeasing. In all styles a lean-to, a flat roof, and a gable, either acute or obtuse, at right angles to the higher portion, will group satisfactorily. This suggestion refers, as it is hardly necessary to note, exclusively to a country house, or at least not to one in London; and I have begun with it because it has most directly to do with the fabric itself.

To come to the roof: almost all forms of roof, high pitched or low, ridge and furrow, or pyramidal, mansarde or straight-sided, gabled or hipped, are good in their place, except one form, which is the favourite with the country and suburban builders,—the one which stares you in the face like an obtuse truncated pyramid. When you have to deal with such a roof, you can only carry it off by the accessories, or make it anew; in itself it is hopelessly mean; and to those who are imaginative enough to see physiognomies in house fronts, it conveys the idea of mental imbecility, with its low receding brow, and the shapeless windows, goggling and blinking underneath like big stupid eyes. For my own part, I do not at all dislike that peculiarly Italian roof—the *very* low-pitched complete pyramid, if only the eaves are broad, and if it be covered, not with slates, but tiles, the bigger and coarser the better. A roof really high enough to contain and cover-in good rooms, with bold dormers, is no longer a novelty in our cottages. Into the small or country houses of this century it has hardly been introduced, common as it was in Queen Anne's reign. You see I have propounded as possible and good in their respective ways two very different types of roof for my house in the country. I pass over gables, either of the austere Gothic, or the frolicsome Jacobean family, simply because I take them for granted; they are the most obvious, but not the only, often not the possible, way of creating sky-line. There is no reason, under special circumstances, that the same roof may not in the same house abut at one end against a gable, and, at the other, slope down as a visible roof on to its eaves. While talking of gables, I must advert to the variety often given to the sky line by hipping them. There was a time when I had no fancy for hipped gables, but long familiarity with them, in the district in which I habitually live, the Weald of Kent and Sussex, where they have been and are in habitual use ever since the middle ages, has brought me to the belief that there may be a refinement and a softness in a hipped gable, of which the straight gable is destitute. It is certain, that while the sky-line of an ordinary gable, viewed directly sideways, is simply that of any other wall with a roof abutting on it; the similar contour of the hipped gable offers a special pyramidising outline. Mind, I am only arguing for hipped roofs in their right places, and, generally speaking, for hips which do not slice off very much, and which are roofed with tiles. The gigantic hipped transepts of a large German church does not find their advocate in me.

How many of these suggestions, as to the roof, are applicable to the semi-detached house? All, I answer. The recommendation of the low pyramidal Italian roof, if only it be conceded that the two members of the couplet need not be exact matches, and above all, that it need not be built so as to sham one mansion with a single pitch of roof and with the division wall running right through. Under such circumstances, such a roof would be a monstrosity, not to talk of the difficulties as to the chimneys. But why, for example, should not one of the houses exceed in height and be built three stories high with that roof, and the other be lower and more extended, with a roof admitting of dormered attics? The really great difficulty in all probability which would dog the steps of the builder intent on giving variety of outline to his semi-detached house, would be that unless one side looked just like the other, the respective tenants would mutually, though diversely, come to the conclusion that the other side was better distributed, and growl accordingly at the parity of rent. The way to meet this, which occurs to me, would be boldly, and on principle, to couple together in each group, houses of different rentals. If the builder has to run up a dozen houses at eighty, and a dozen at sixty pounds a-year each, it cannot make much difference whether all of each price pair off, or whether each higher priced house finds itself married to one of an inferior rental. But after all, and this is the melancholy feature of the case, until the wives of England are better grounded in artistic principles, the fight must always be uphill. Such houses, occupied as they usually are, by men of business, are no doubt usually looked out, and usually looked after, by the wife; and I fear that to the average wife, the average house has a familiar and agreeable aspect.

The roof of the town house is generally a simpler problem to handle than that of the country one, because the opportunities of attaining a satisfactory result are less. In a corner house, indeed, playful and original treatment may often be possible; and if the streets happen to meet at an acute angle, the form which the architect of taste must adopt will usually have something about it of the apsidal or domical feeling. When the junction is of two right angled streets, the building is *pro tanto* for two of its sides removed into the class of country houses. But most houses stand in a street row. Probably the first idea which rises to the mind of the lover of the picturesque, who has walked up Harley Street or down Gower Street, with his head full of the gables of Amsterdam, or of some old Flemish or German city, is a feeling of resentment that our towns should not be built likewise. But if we apply the test of measurement, we shall find that there would be substantial difficulties in the way. The usual run of English houses are too small for the larger type of German gables, story upon story, and too big for those of Amsterdam or Bruges, whose inhabitants, accustomed to more simple habits of life than Englishmen, contentedly inhabit apartments which we should think intolerably small. The tall narrow Dutch house runs quite naturally up into its gable, which is, moreover, in later specimens, usually recurved at the sides; besides which, the gable room is usually not a sleeping place, but a large store chamber, and often has in the middle a door for the object of craning up goods from the street. I believe it would pretty severely test the ingenuity, as well as the daring, of any Fellow of the Institute to put a gable on any house in Harley Street or Gower Street (adapted, of course, as being an English attic for servants rooms), which would bear the same proportion to the pile below as an Amsterdam gable does to its house. I do not, of course, say that the house-broad gable cannot be introduced into town houses when they are built *de novo;* but it never can be added on to an existing house.*

The sky-line of the house in the row, which is of course only visible on the street-door side, must chiefly depend on its chimneys, and on the bold dormers of the windows standing out of the loftily pitched roof. Sometimes a house is built so much more lofty than the rest that it can display all four sides, but such cases are exceptions. While disbelieving generally in the possibility of gabled houses for (at all events) London, of which city chiefly I am speaking, the case, I fully grant, being different as to the smaller abodes and the more roomy areas of provincial towns, I cannot at all see why two-storied attics, either of the one-sloped or the mansarde type should not be extensively introduced; they always look well and stately, and they may always be made both useful and comfortable, with windows opening to the outside, and rooms of adequate height. In the treatment of the gutters, which he will have to bed in cornice-like projections, the architect has the opportunity of much good design; but as this is not sky-line, I ought not to have mentioned it. The adventitious enrichment of the sky-line, which a ridge crest will contribute, is a point to be noted here, though it need not now be discussed.

This will be the place to say a few words upon a form of steepled roof, which has within these few years left its mark, both upon Mediæval and Renaissance buildings in London, the truncated steep pyramid, or four-sided spire. Among the foreign importations, there is no one more distinctly exotic than this, which never, I believe, crossed the Channel from its native France until it appeared upon the secondary towers of the Palace of Westminster. It has accordingly been, on the one hand, warmly welcomed by all the architects whose first idea was to reform the insipid sky line of our urban buildings, and on the other, cold-shouldered alike by the pure classicists and the votaries of inflexible English Gothic. My own feeling is that it is a valuable addition to our repertory, but that it ought to be employed under conditions. Generally speaking, it is admissible when it surmounts a tower whose parapet is elevated above the average roof line, or when it gradually grows out of the roof itself. I cannot look upon it as well placed when it is planted on the angles of a building at the same elevation as, but quite detached from, the residuary roof. Besides, in every case, I believe that the architect ought to coax its lines, and bring them down to the base, so as to curve, more or less, gently outwards. A rigidly straight contour can hardly fail to be somewhat stiff. Again, this sort of roof ought if possible not to be covered with the ordinary square-cut slates; smaller slates, scallop-cut, or tiles or lead is preferable. Finally, the effect is much heightened if the summit is, as at the Palace of Westminster, enriched by a conspicuous ridge crest, and if the flanks are dappled with small dormer openings.

---

* I was much struck, when last in Dublin, with the number of gabled houses, of an evidently Dutch type, which I discovered in that portion of the town which lies between St. Patrick's Cathedral and St. Stephen's Green. I could only account for this phenomenon by supposing that Dublin had taken a start in house building consequent on, and under the influence of, William III.'s accession.

The absolute cupola can seldom be introduced, either into the small country or the street house. But there are other forms, approaching to the domical, which can be used, if not as portions of the main roof, at all events as the capping of appended towers. An appended tower, rising from the ground, may not be often possible in a town house; but in the country it may frequently be an addition, as sightly as economical, to a new house, and it may often go far to cure an ugly old one of its æsthetic and practical shortcomings. A new staircase is wanted, either in addition to the old one, or in order to throw the original staircase into the room. The problem will often be best solved by placing the staircase in a tower. A pantry, a store closet, a dressing room, a tank may be needed, all or any of them may be provided for in the tower. How then is the tower to be roofed? What will be its function in making the sky-line? If it is square it may, of course, be roofed with a simple pyramid, permissibly of a very low pitch, if the style of the house be Italian, else with one of a steep pitch, or with a low octagonal broach; and if polygonal, with a polygonal spire. But this does not exhaust the resources, for the square or the polygonal tower may equally be crowned with one of those cappings of an ogee outline, which Jacobean architects ingeniously developed out of what was undoubtedly one of the cleverest inventions of our later perpendicular architects, the domical capping of the Gothic turret. A similar termination may crown the circular turret, unless in this case the simple circular, rather than the polygonal cone, should be preferred, from the union which it in its sections presents of the curved and the straight line. If the tower be square, the square concave pyramid may likewise be chosen. The four-sided French cupola is also a form of which our architects have hardly yet tried the capabilities. It seems to me, one which is peculiarly suitable to towns, if not repeated *ad nauseam.* All who can remember the old British Museum will recollect how effective this form is for street picturesqueness.

If the cone be preferred as the capping, the best existing English models will have to be sought, not from mansion or castle, but from the kilns called oast-houses, in which the farmer of Kent and of Sussex dries his hops. The oast-house usually consists of one or two round towers, with conical cappings attached to an oblong building. The latter are for the miscellaneous work; and the towers are the kilns in which the hops are dried, the tops being left open to let off the fumes. I need hardly say that these buildings, with their piquant sky-line, most characteristically enhance the landscape, sometimes nestling in green valleys, and sometimes crowning the continuous upland, especially as they are usually covered with rich coloured tiles.

Supposing, however, that town houses do not admit of towers and turrets growing from the ground, what objection can there be to the corner houses at least being enriched with those angle turrets, polygonal or circular, corbelled out of the walls at midheight, and crowned with steep roofs, which are so thoroughly identified with the early architecture of France and of Scotland? I know not if any Building Act stands in the way of such projections in London; I should trust not. Any how, there can be do difficulty in their being tried out of London. In that most eminently picturesque building, the Masters' Court, built *vis à vis* to Trinity College, Cambridge, by the joint taste and talent of its founder and of Mr. Salvin, such a turret has been introduced with the most perfect success. The usefulness of such a projection, as an additional small room, stands to reason; its picturesqueness is equally beyond dispute. Though it is derived from a Gothic source, it may be equally worked out in Renaissance architecture.

So much upon the subject of roofs; now let us turn to chimneys. Early in this paper I spoke against chimney-pots. I did not, of course, mean to condemn all chimney-pots, but only those abominations in earthenware and in metal which have for so many years monopolised that name. Let but our architects agree to provide the designs for the chimney-pots which they use, and let them make their choice among the patterns, according to the circumstances of each case, and a notable improvement will, by this simple expedient, have been made in the average sky-line. But let us first consider the chimney entirely constructed of stone or brick. Sufficient use has not yet been made in this country of the chimney of which those at the Tuilleries, before referred to, are a striking example. The principle of their construction is the usual one of massing several flues side by side in one tall quadrangular stack, long and thin. The specialty of the form is its height. Such a chimney seen full-face, rising from a mansion, has almost the effect of a tower. If the chimneys are many, the intricate effect of the diverse angles of the various stacks is specially picturesque. While the French Renaissance has the credit of the first idea, it is one which may be adapted to all styles, and the specimens may be variously decorated by surface panelling, or inlaid patterns of differently coloured materials. The only drawback which I know is, that some stays may often be needed to buttress up the mass against the wind. But for what chimneys are, I suppose, peculiarly intended—to carry off the smoke—this form is especially successful. I speak from experience, as I inhabit a house which the late Mr. Carpenter's skill converted into a Louis XIV château, with a mansarde roof, planned so as to contain on each of its two floors rooms with sufficient headway, fire-places, and windows that can open, while he raised the lofty chimneys to such a height above the ridge as to make the house, generally speaking, smoke-free (a condition which it had never before fulfilled), and at the same time to produce a very varied sky-line. I venture to make this personal allusion, not only because I feel it just to the memory of one who has been too early called from us, and who did not live to see the completion of his own work, to commemorate a successful achievement of his in a style with which he was not usually identified, but because it was to having to deal with my own house that I chiefly attribute the formation and ripening of my own ideas, on sky-line. Had I been building a house from the ground, I should no doubt have made it Gothic; but I had to deal with a house which was Italian, and which it would have been impossible to have Gothicised. So I asked myself the question, what principles of beauty and of convenience are there which give a charm to Gothic and yet can be grafted into Italian without detriment to its unity of style? My answer to myself was, high roofs and tower-like chimneys fulfil these conditions, and so a nineteenth-century Italian house may be turned into a free imitation of a Louis XIV. château, without involving the destruction of any form or feature existing below the cornice.

No doubt the construction of loftier chimney stacks in town houses entails more outlay at first, but that outlay is abundantly re-compensated by the comfort of smoke-freedom which it brings with it. The particular kind of chimney construction of which we have been talking is equally suited for town and country. Whether or not the more habitual forms of Gothic chimney which we so often see, wherein each flue is represented externally by its own circular or angular shaft, can be so easily fitted to the conditions of civic building, is a question which I shall not raise. But I must introduce to you a peculiar form of old English chimney, indigenous in the Weald, and still habitually constructed there with successful ease by country workmen, which, from the simplicity of the materials used and the beauty of the result, would prove a valuable addition to the sky-line repertory, either of town or of country. Several flues are collected into one stack, of which the material is always brick, the section being square or rectangular, sometimes varied by an angular projection at the sides, so as to produce a species of star-shaped plan, and sometimes by a projecting vertical rib. The shaft is generally pretty lofty, and at the summit the chimney spreads out with several tiers of bricks overlapping each other, and of course following the section of the shaft, while sometimes the effect is heightened by a moulding of bricks put anglewise. Nothing, you see, is used but common brick (here and there of course cut), but the gracefulness, yet solidity of outline, and the effects of light and shade which one of these chimneys gives renders the idea well worthy of developement for more imposing structures than those which they at present surmount.

As for chimney-pots, I have little to say more than I have done, viz. that as no doubt they are often needed, they are not beneath the architect's care. If they are put up behind his back, or because he despises such trifles, then his work will no doubt be spoilt (if there is spoiling in it), with or without his own fault. As a general rule, I think I may once for all say that the architect who does not intend to design his chimneys (with or without chimney-pots) high enough both to carry off the smoke, and also to gratify his own eye by the sky-line they make, is so far untrue both to the practical and to the artistic requirements of his profession. If, after all, he makes a mistake, and if chimney-pots are needed to cure the smoke, so much the more pity; but at all events he will have meant well. I can find no such excuse for the architect who does not intend or care to provide a chimney tall enough for a chimney's first duty in the order of created things—carrying off smoke. I again repeat, to avoid mis-conception, that I allow of chimney-pots, provided these pots are designed or selected by the architect, not by the smoke-doctor; and I ask if the mystery of smoke-cure is very much deeper than many other practical questions which have to be fathomed before the aspirant ventures to practice. There is a form of chimney-pot common in Venice and other Italian cities, consisting of a cylinder expanding towards the top, like a funnel. Whether it was the novelty of this form which struck me or not, I rather liked it, and I venture to offer it for consideration, supposing its powers of drawing smoke to be beyond question.

You will see that the sky-line of which I have all along spoken has been a rigidly practical one,—nothing more than the roof and the chimney. It would lead me far beyond the limits of a paper if I were to enlarge on the conditions under which the sky-line might be further varied by a turret or a spirelet rising from the roof. This is often far from a useless appendage, when a ventilator, a clock, or a bell is wanted; and my experiences lead me to think that when there is a real use for a thing, the honest intention to make it graceful as well, is seldom difficult of accomplishment. I must also postpone what I might have to say on the fringing of the sky-line, by crestings of metal or terra-cotta. It is a question which I commend to those who have to work out the question as well worthy of their attention.

There is one general consideration with reference to the necessity of an effective sky line in country houses which must not be overlooked, that the condition of the forms and the foliage of the trees brought into immediate juxtaposition with our houses is undergoing a notable transformation. Every day the cultivation of the gigantic and rapidly-growing conifers of Western North America, India, and elsewhere, which experience has proved to be hardy in this climate, is becoming more and more common. In large demesnes these are often by preference—in small demesnes they must always by necessity—be planted close to the house. It is not then too much to say, that in every Wellingtonia and in every Douglas fir which we see pushing upwards its peaked aspiring head, and in every Deodar which is gradually maturing its broad and massive outline, close to the homes of English comfort, we see a fresh demand upon our public taste no longer to allow the study of the architectural sky-line to remain in the category of the things which are permissible but not essential.

The **PRESIDENT** (Professor **DONALDSON**) said they had been favoured with a very suggestive paper, and he should be happy to hear gentlemen who had any observations to make upon it. He regretted that the commencement of the paper should have been deferred so long as to leave but a very brief space of time for its discussion. They could, however, hardly pass away with the mere impression of what was said. Some present would doubtless wish to give expression to their views upon what Mr. Hope had so kindly suggested to them.

M. **DIGBY WYATT**, Fellow, said that it was to be regretted that the late hour left them too little time to give adequately to Mr. Hope and Mr. Nelson the vote of thanks which was so justly due to them. The papers read that evening, though apparently disconnected in theme and scope, had yet something in common. The last had presented to them the results of an elaborate investigation into one of the most difficult problems of their art; and one which it had occupied no mean portion of the life-long labours of the subject of the first—the illustrious Von Klenze, to carry out practically and successfully. With how much skill and mastery, the beautiful "sky-lines" of the Walhalla, the Röhmes Halle, and the Glyptothek would bear witness for, probably, very many centuries. Mr. Wyatt had felt anxious, when the first paper was concluded, for an opportunity of bearing his humble personal tribute to the extreme elegance of Von Klenze's manners, which united French vivacity and polish with German manliness, warmth and kindness. Nothing could exceed the activity and intelligence of his bearing, and the hearty interest he had manifested in the spread of a knowledge of the best models of art, on the occasion of Mr. Owen Jones and Mr. Wyatt's first sketching out to him the grand projects of the Crystal Palace at Sydenham. It was entirely through the prompt and spontaneous exercise of his kindness, and by the employment of his personal influence (which seemed to be unbounded) with King Louis, that this country had been favoured with original casts made, for the most part for the first time, from many of the grandest specimens of the celebrated collection of antique sculpture in the Glyptothek at Munich—such, for instance, as the Eginetan pediments, the Ilioneus, the Barberini Faun, and the Rondanini Muse. He procured for Mr. Jones and Mr. Wyatt the honour of a private audience with King Louis, and backed with his fervid assurances, their protestations, not only that the operation of taking the casts would do the works of art no harm, but that it would redound to his Majesty's credit that the fact of his collection of such splendid relics of antiquity should be made palpably known in this country. In comparing the works of Von Klenze with those of his contemporaries—such as Von Schinkel, Gärtner, Ziebland, &c. Mr. Wyatt strongly felt his superior excellence. The Prussians would no doubt stand up for the more plastic imagination of the first named of those contemporaries; and there could be no doubt that the example set by Schinkel was of the greatest possible value in the formation of Von Klenze's architectural style; but it was nevertheless probable that the tests of time, as applied to the monuments erected from the designs of both, would ultimately vindicate Von Klenze's superiority. His studies were based upon the revival of the antique at Paris under the school of David and Girodet in painting, and Percier and Fontaine in architecture. The latter and others were doubtless great men in their several ways, but it was to be remembered that no one of recent times, at the early period at which Von Klenze first attempted the union of painting and sculpture with architecture, in his designs for the Glyptothek, had contemplated any result so truly and emphatically monumental. That noble union he was, Mr. Wyatt believed, the first man in his generation, on this side of the Alps, to carry to a successful issue. Under his council and guidance, and by his untiring energy the talents of Hess, Cornelius, Schwanthaler, Rauch, Von Schnorr and others had been made tributary to undying effects of monumental art. For an honourable life of labour and the fervid exercise of rare artistic and practical capabilities Von Klenze was entitled to their most supreme respect.

Passing from Mr. Nelson's contribution to the evening's entertainment, the speaker was pleased to recognize that although at the beginning of his paper Mr. Hope had attacked (and with some justice) the "sky line" of Somerset House as presenting a lamentable contrast when put in comparison with the sky line of many other buildings at home and abroad, he had, at the same time (with his usual tact and honourable candour), admitted, that rarely, if ever, had the contours of many of the buildings designed by Wren and Inigo Jones been excelled. When the student looked from the top of the Monument in London over the beautiful campaniles of the City churches, the splendid dome of St. Paul's, and onwards to the accumulated glories of Westminster, and compared his impressions with that which he might have received from a corresponding survey from the Campanile at Venice, Mr. Wyatt thought he would have to admit that England offered the nobler prospect of the two, so far as architectural sky-line was concerned, even taking in the lovely outlines of the Salute and Dogana.

Had time permitted he would have been glad to have heard Mr. Beresford Hope's impressions of the value of the singularly varied compositions of probably the greatest architectural genius of the present generation—that most accomplished master of "sky line"—the late Sir Charles Barry. When one saw the graceful towers of Trentham, the well-balanced masses of Clifden, Bridgewater House, and other buildings of Italian character, as well as the varied silhouettes of the Houses of Parliament, profiled against the sky, it was impossible not to acknowledge Sir Charles Barry's command over the mysteries of that branch of architectural composition which had formed the subject of Mr. Beresford Hope's paper. By the architect of the Palace at Westminster the difficult question of chimneys had never been evaded nor carelessly carried out.

While Sir Charles Barry's *practice* had been so valuable in the matter of "sky line," the *precept* of the late Mr. Cockerell had been no less so. He remembered, when quite a student, the very admirable lecture given by their late regretted President at the Royal Academy on the subject of sky line, (it was, he thought, the second or third after his election as professor of architecture to that institution) illustrated by his own beautiful drawings, and by many from the pencils of Gandy, George Moore, and Dodgson. The masterly style in which he had laid down the principles of judicious contrast as a source of delight was most excellent, and never to be forgotten by those who heard him. The way in which he showed how one form might be brought out to relieve and enhance the beauty of another, the value of the long straight line as giving additional emphasis to the salient spire or dome, was one of the happiest æsthetical demonstrations the speaker had ever listened to.

In conclusion Mr. Wyatt expressed the obligations of the meeting to Mr. Beresford Hope, who he was rejoiced to find clearly recognized, that it was not in any particular form or style that the excellence of effect he contended for was alone to be found, but that it was possible for all, without sacrifice of individual character, to unite in the production of an entirely satisfactory effect. He now begged to propose votes of thanks to Mr. Beresford Hope and to Mr. C. C. Nelson for their labours for the entertainment and instruction of the meeting.

The PRESIDENT said they must all own that their friend Mr. Hope possessed an hereditary sympathy for art in general, and for their own in particular: and the son of a man whose name was dear to every architect had felicitously suggested a topic rich in material, to which he had added judicious observations, both suggestive and instructive to architects. The son of the historian of architecture has shown originality in his treatment of the subject, and has handled it with a judicious reserve, which they must all admire. As to Somerset House it was true the great defect of that building was in the upper portions of the river front, while the lower parts were noble in design. At the same time if they took another portion of the same building, the Strand front, they found much to admire in the sky line, and the courts were very grand. He might compare the river front of Somerset

House with a work of the Louis Quatorze period, viz. the garden façade of Versailles. Perhaps there was hardly anything to be found more tame. It wanted the high-pitched roof, which Mr. Hope had suggested, and the chimneys carried up, forming that outline he so much admired, as was done not only by architects of the Louis Quatorze period, but even in the works of preceding sovereigns, as at Blois. There was boldness of design, which was not equalled in the Louis Quatorze period. Mr. Hope had alluded to the Host-house of Kent, which reminded one of the pigeon-cotes in the villages of Egypt, and which greatly varied the square outlines of the structures in that flat country. Chimneys, dormers, balustrades, and other terminal objects to vary the sky line had been illustrated in the publications of the Architectural Publication Society. The managers of those publications had given a series of sheets of the most valuable kind, showing the manner in which peculiar forms might be given to even the commonest subjects. Mr. Hope had been kind enough to call their attention to this matter. He only wished in addition that he possessed the same graphic powers as his late father, and that the paper had been accompanied by the same richness of pictorial illustration which distinguished Thomas Hope's famous work on architecture. He was quite sure the vote of thanks, which had been proposed, would be accorded to Mr. Hope with the greatest cordiality and unanimity.

A vote of thanks was also passed to Mr. C. C. Nelson for his memoir of the late Leo Von Klenze.

A SHORT DESCRIPTION OF THE SERIES OF WORKING DRAWINGS OF THE NEW OPERA HOUSE NOW BUILDING AT PARIS, PRESENTED TO THE INSTITUTE BY THE ARCHITECT, M. CHARLES GARNIER.

By **The President, Thomas L. Donaldson.**

Read at the Ordinary General Meeting of the Royal Institute of British Architects, April 4th, 1864.

The President said, during his visit to Paris, in December last, he was able to obtain a considerable amount of professional information, and amongst the rest, some which he thought was of interest to this Institute. Amongst other large public works in course of prosecution in Paris was the New Opera House, designed and now being carried out by the architect, Mons. Charles Garnier. Being desirous to obtain some particulars respecting it, as well as to gratify himself by an inspection of the operations as far as they had proceeded, he went to the office of the architect on the works, and that gentleman very courteously accompanied him over the whole of the building. He afterwards showed him a vast number of drawings of all the details of the work, so far as it was then executed. Having remarked that they had no such class of elaborate drawings prepared for works in London, and that therefore he should be glad to be favoured with a few of them, to show his professional brethren the minute study and remarkable care, which had been bestowed upon all the details of that great work, M. Garnier promised to present some copies, which were now on the walls, to the number of 167. As was usual, the drawings had been prepared with a kind of autographic ink, capable of being transferred to stone or zinc, from which as many impressions could be taken as the architect required. Every architect of a large building in Paris had his *atelier* on the works, with a number of draughtsmen employed in preparing the drawings; and the dimensions of every stone are given, that its due value might be estimated when worked up in the building. At the time of his visit to Paris the building had only reached the first floor; and if the drawings for the entire structure were carried out in the same elaborate manner they would probably number over 500 or even 1000. However, he was very glad to get this instalment, for he felt it was to the interest of the Institute to have them, and he trusted they would be put together in a volume for future reference.

Having made a somewhat minute personal inspection of the works, he would, by the aid of the drawings, describe what he knew with respect to this New Opera House. They were aware that Napoleon III., like Augustus of Rome, was really rebuilding Paris; and though marble was not the material employed, still the works were carried out in good sound stone, and were constructed altogether in a style surpassing anything previously executed in that capital. The class of stone employed was superior, being got higher up the Seine, and from other quarries; and the works were in every way sounder both as to material and execution. They were aware, with respect to the "*coupe des pierres,*" that no school in the world was so celebrated as the French. There was the most elaborate design of all the parts and joints, and it was necessary to have men of very superior ability to carry out that class of construction. Many present would doubtless recollect in the constructions at Versailles of the period of Louis Quatorze, there were staircase landings of very elaborate structural combination. In England, large landings were simply slabs of Portland or Yorkshire stone, without any peculiarly geometrical combination of parts, and merely pinned into the walls to hold them up; but at Versailles there were landings six or eight feet wide, composed of comparatively small stones, with a complication of arches, so put together, that, though greatly projecting from the wall, they were perfectly solid and substantial.

As he had said, Napoleon was re-building Paris. In addition to piercing the city with large open streets and thoroughfares, he had built an immense number of theatres. In the Place du Chatelêt, on the bank of the Seine, and on the line of the Boulevart Sebastopol, the municipality had erected two large theatres—one on each side—and many others in other parts of Paris. Among these operations had been commenced this grand New Opera House, opposite the end of the Rue de la Paix, and on one side of the new Boulevart Malesherbe. The building itself occupies nearly 2⅔ acres of superficial area. We must estimate such monuments by acres, and the streets by miles. And it was in this grand style that the present Emperor took up these operations, which for magnificence and extent were worthy of the time of Augustus. It was not to be imagined, however, that this building was very much larger than some of the greatest ancient theatres. He recollected measuring a theatre at Dramyssus, in the Epirus, the diameter of which was 400 feet; but this building was 490 feet long, and the extreme breadth 328 feet.

The President then proceeded to describe many of the drawings, particularly the plan. In the first place, was the front arcade, 189 feet wide, and with an avenue behind it 12 feet broad. This led to another vestibule, 224 feet long and 30 feet wide, which again conducted to an inner vestibule 18 feet wide. The crowd would come in at different entrances, so as to prevent an insufferable degree of pressure at any time; and they were gradually brought from the points of entrance to the interior. The area of the principal staircase was 52 feet square. The steps rose from the centre and turned off right and left, being 15 feet wide. There were also three secondary staircases, with flights of steps each 8 feet wide, so that abundant room was provided for entrance and exit. All this was devoted to the entrance into the theatre, which constituted the great difference between the theatres on the Continent and those of London. They afforded greater capacity of circulation, whilst in this country the greater portion of the area was necessarily devoted to the audience part, so restricted were the plots appropriated to our theatres. A side entrance and private staircase was appropriated to the Emperor and his suite. Here was a circular hall, 45 feet diameter, leading to the private staircase, which led up to the Imperial box, in connexion with which was a magnificent circular saloon, 45 feet in diameter, sufficient to receive a cabinet council, should affairs of state require such a contingency. The lower corridor, 17 feet in width, opened into a lower range of boxes. He gave these dimensions for the sake of comparison with the narrow corridors of accommodation generally prevailing in the theatres of this country. Here they had another staircase and smaller staircases right and left. With regard to the theatre itself, the width between the fronts of the boxes is 68 feet, and the width between the walls behind the boxes is 100 feet 6 inches; the depth of the house is 100 feet. The width of opening of scene is 52 feet; the depth of stage, 98 feet; admitting of an extension of 57 feet, making a total depth of stage of 155 feet (unequalled in any other theatre) for effect in grand spectacles. The extreme width of the stage is 175 feet. The French arrangements for the machinery at the sides were of great perfection, and had lately been, to some extent, imitated in this country; and the whole body of science and skill had been brought to bear to make the entire combinations of this remarkable building as perfect as possible.

He should state, with regard to the new theatres in general, great study had been given to the lighting and ventilation. In the theatre of the Place du Chatelet, the lights were placed above the ceiling of ground glass; but, as far as his experience went, he considered such a light rather obscure; and he thought the introduction of the intermediate screen was not altogether successful. At present, the system of ventilation was very much one of experiment; they could hardly say whether, in each particular instance, it would be successful or not; and it required a good deal of practical knowledge and science, and he would add, patience, to succeed in carrying out a well ventilated building. Whether in a single room, or in an entire building, or on so large a scale as in this theatre, the subject of ventilation was still one of the most difficult of problems.

The President then directed attention on the drawings to that part of the building, which was appropriated to the administration of the establishment, and the rooms for the various classes of artistes, the number of which were immense, and admitted of that disposition of the several classes of artistes and theatrical property, which was so necessary to realise, and which would enable the most judicious arrangements in that respect to be carried out by a complete and systematic classification. As this building was only now as high as the first floor, he could not lay before the members the complete drawings and plans of all the parts, but from the 176 drawings which had been presented they could judge of the magnificence of the design and execution of this work, and the elaborate study that had been bestowed upon it. There was a profusion of taste and imaginative faculty, which some might consider had perhaps been carried to luxuriant excess. The estimated cost of the building was from £700,000 to £800,000, but there was no doubt it would cost at least £1,000,000; and with the many appliances and means of execution at command, it would be an European monument of the greatest magnificence.

He had given them this general information, not having had time to study or even to obtain more minute details from the architect. Assuming these plans to be correct (and the French were remarkably correct in their drawings as well as in reduced drawings) he now wished to draw attention to a comparison of the sizes of the principal European theatres. Here was a table shewing the area of the New Opera of Paris to be 2·65 acres; that of the Old Opera, 1·50; Madrid, 1·00; Covent Garden, 0·70; St. Petersburg, 0·75; Bordeaux, 0·75; Carlo Félice (Genoa), 1·00; Parma, 1·00; La Scala (Milan), 0·90; S. Carlo (Naples), 0·90. The width of scene was, in the New Opera of Paris, 52 feet; Old Opera, 40 feet; Madrid, 55 feet; Covent Garden, 40 feet; St. Petersburg, 45 feet; Bordeaux, 38 feet; Carlo Félice (Genoa), 40 feet; Parma, 40 feet; La Scala (Milan), 45 feet; S. Carlos (Naples),* 45 feet. Another great feature of this New Opera consisted in the great depth of stage provided for, which was necessary for the due display of scenic effects in the present taste for melodramatic representations. The Italians were the first to make these great depths of stages, owing to the dramatic character of their ballets, while the French ballets consisted principally of dancing only, rendering a greater depth of stage necessary in the former case, by which the aerial effects of distance in pictures were capable of being produced upon the stage.

In conclusion, the President said he had given these general dimensions; he could not vouch for their precise accuracy within a few feet, but they would serve to give a general idea of the leading principles, which directed the construction of such buildings, and they saw how far those principles were realised by different nations; and they must look to the genius and tendency of the people by considering the size of their theatres, and the manner in which they carry out their dramatic representations. He hoped these few particulars would not be without interest, and they could not but feel very grateful to Mons. Charles Garnier, the generous architect, who had given them these studies of his art—evidence of great merit.

Upon the motion of Mr. Kerr, the thanks of the meeting were accorded to the President for his communication, and a special vote of thanks to Mons. Garnier for his valuable contribution to the collection of the Institute.

---

* Mr. Fergusson, in his able work on the "History of Modern Architecture," gives an useful table of comparative dimensions of European theatres, which, however does not include the Italian ones.

SOME ACCOUNT OF RECENT DISCOVERIES OF PLACES AND BUILDINGS OF THE FOURTH TO THE SEVENTH CENTURIES IN THE HAURAN, NEAR DAMASCUS, AND IN THE COUNTRY ABOUT ALEPPO AND ANTIOCHEIA.

By The President, Thomas L. Donaldson.

Delivered at the Ordinary General Meeting of the Royal Institute of British Architects, April 4th, 1864.

The President said that he had recently had the opportunity of making, through Mons. Longperrier, Conservator of Antiquities at the Louvre, the acquaintance of the Comte de Vogüé, author of the work on the Churches of the Holy Land, and who had lately returned from a visit to Syria, exploring more especially the Basaltic Deserts of the Hauran to the south of Damascus, and the less arid districts to the north, about Aleppo and Antiocheia. M. de Vogüé had showed him the engravings of buildings for a fresh work he was about to publish, opening out a new subject for consideration of a period, of which we have no idea in this country, and which had never been illustrated, though mentioned by travellers. He thought this might be interesting to the members of the Institute, and he ventured, in a conversational manner, to communicate to them the few facts, of which he became possessed.

Having pointed out upon a map the geographical position of the region under consideration, the President went on to remark, that the Holy Land had already been searched thoroughly. It had recently become celebrated from the visit of the Prince of Wales. A great many of the principal buildings were pretty well known; but the district of country—the Auranitis and Trachonitis of the ancients—had never been properly explored. Mr. Cyril C. Graham read a paper before the Royal Geographical Society on 22nd February, 1858, in which he gave a highly graphic account of his travels in the desert east of the Hauran, and in the ancient Land of Bashan. Mr. Graham alluded to previous travellers, who had gone through that country; it was, therefore, necessary to consider the discovery of these ancient cities in chronological order. M. Seetzen, attached to the Russian embassy, visited the Hauran in 1805. Burchardt was struck by the account contained in Seetzen's description to Barth Zack, and determined in 1810 to explore the country. His travels in Syria contains a very detailed account of the numerous ancient towns in the wilderness of rocks in the great desert on the eastern limits of the Land of Bashan. He was succeeded by the superficial Buckingham. But we are indebted to Mr. Porter, our consul at Damascus, for the more perfect description of these parts in 1853. Mr. Cyril C. Graham rapidly explored this country in 1857, and communicated the results of his journeyings in the paper read before the Geographical Society on the 22nd February, 1858. One of his opening passages is very graphic.

"I think if you were to tell the most phlegmatic person, that from an ancient castle perched on a hill, and which had been the turning point of all travellers, a wide plain extended, which as far as the eye could reach was dotted over with towns, which were known to have been uninhabited for centuries, but which no person on record had entered, his enthusiasm would be kindled, and he would be desirous of sallying out on a journey of discovery into this plain. But when that castle perched on a hill is Salcah, and that hill 'the Hill of Bashan,' and those cities in the plain 'the cities of the Land of Moab far and near,' the very cities of which the Prophet spoke when he said, 'The cities thereof shall be desolate, without any to dwell therein'—then an irresistible desire comes upon one to go out among these cities, and see the habitations of a once powerful people, who have so completely passed away, that as far as we know no descendants of them are now to be found."

It would appear that these towns, constructed of stone, and many of the erections being built of huge squared blocks of hard basalt, retained their buildings in a wonderful state of preservation; in fact, so much so, that the Druses, driven to these wild parts for shelter from their oppressors, had very little to do to render them quite habitable, for frequently even the very doors, formed of a stone slab six feet high and twelve thick, with hinges as tenons wrought out of the solid, remained *in situ.* A specimen of these doors exists in the British Museum. Flights of stone stairs are found outside and inside the buildings.

The President then proceeded to illustrate the method in which the stone roofs of the buildings in this district were constructed. In the entire absence of trees in this basaltic region, the roofs were built with frequent arches, springing from piers at a very little distance apart, and covered with slabs of stone after the manner of the Egyptians.

Mr. Graham alludes particularly to the enormous city of "Um el Jemal," to the south of Bosrah, and probably the "*Beth Gamul*" of scripture, and which stands alone in the desert.

"This is, perhaps, among the most perfect of the old cities which I saw. It is surrounded by a high wall, forming a rectangle, which seems to enclose as much space as the walls of the modern Jerusalem. The streets are many of them paved, and I saw here what I do not think I saw anywhere else, open spaces within the city such as we should call squares. There were some very large public buildings; but although I diligently sought for inscriptions, I only found three: one of them in red Greek letters on a large tower, which I fancy was a prison, or perhaps in later times a convent, as there were many red crosses upon it. The houses were some of them very large, consisting usually of three rooms on the ground floor, and two on the first story, the stairs being formed of large stones built into the house walls, and leading up outside. The doors were as usual of stone: sometimes there were folding doors, and some of them were highly ornamented.

"On reaching this city (as indeed it was my practice in all such places) I left my Arabs at one particular spot in charge of the dromedaries, and posted sentinels on the towers to watch the approach of any foe; then, taking my rifle with me, I wandered quite alone in the old streets of the town, entered one by one the old houses, went up stairs, looked into the rooms, and in short, made a careful survey of the whole place; but so perfect was every street, every house, every room, that I could almost have fancied, as I was wandering alone in this city of the dead—seeing all perfect, and yet not hearing a sound that I had come upon one of those enchanted places that one reads of in the 'Arabian Nights,' where the population of a whole city had been petrified for a century.

"In Um el Jemal there is a fine arch, like the triumphal arches in Roman cities, and under it lies a mutilated inscription in Latin, almost the only one in that language I saw in the Haurán. No doubt this city, from its size and the richness of the soil about it, must have been a most important place under the Roman rule, as in times long before. There are numerous reservoirs here, but, like those in all the other towns about there, they are quite dry. The tombs are outside the walls of the city, so that here, as at Palmyra, they practised extramural burial."

Mr. Murray enumerates the several towns he explored, and concludes with a brief allusion to Um-er-Rumán.

"This was a very curious old town. I had heard a good deal about it from the Arabs, but in this case I found the account they had given about its beauty correct. The houses were in a very ruinous state, but the tombs were more than usually handsome, and decorated with carvings of fruit. Yet they were certainly not Rumán, but resembled some of the more beautiful tombs outside Palmyra. Leaving

Um-er-Rumán we came successively to a number of these old towns. I do not give an account of each of them here because it would be tedious. I have all their names written down, and have copied all inscriptions in them I could find. Amongst the most interesting were Mashkûk and 'Anz."

It appears that thousands of the basaltic blocks strewed on the surface of the soil in these deserts contain inscriptions, and rudely carved figures of animals and other objects, some tolerably well executed, others very rudely incised. M. de Vogüé visited the same tract of country in 1862, in company with Mr. Waddington. In his communication to the "Academie des Inscriptions et Belles Lettres" of the Institut of France, in 1863, he notices the remarkable phenomena of these parts, almost abandoned at the epoch of the Mussulman invasion, and then occupied by the Druses since the commencement of the last century. It preserves, as it were, the physiognomy of the seventh century of our era, for the buildings then ruined by war had not been rebuilt, and those overthrown by earthquakes still lie on the ground, and the Druses, who never build, have established themselves in the ancient houses still standing, or, as wild beasts, find shelter among the piled blocks of the ruins. In the Haurán monuments of various periods still exist. Side by side with those of the Christian epoch, houses and churches are to be found, temples, baths, triumphal arches, residences of the time of the Roman rule, and even some edifices anterior to the Roman conquest. These latter are very rare, and are of the century preceding our Saviour, and of the reigns of the two Agrippas. Thus these present a series of edifices in the Trachonitis and Auranitis, in an uninterrupted chain of eight centuries, and furnish most interesting and valuable materials for the history of architecture.

We find first, that is to say, under the Seleucidæ and the Kings Agrippa, Greek art predominant; but with a certain freedom, yielding to Oriental fancy, and admitting a modification and mixture of the orders and a certain caprice of ornamentation. Then comes Roman art, with its powerful administration and trabeated architecture, which is adopted at Kennaonat and at Bostra, as at Heliopolis and Palmyra. But soon the straight line of the architrave became curved, arches spring from capitals of columns, buttresses line the walls to resist the thrust of the vaultings; the cupola upon the square base appears, at first timid and awkward as at Shakka or at Omm-ez-Zeitoun; then more bold and better put together: and from transformation to transformation we arrive at the polygonal churches of Bostra and Ezra, the predecessors of Santa Sofia at Constantinople. In the north of Syria, however, this revolution is longer in being effected. The large churches of El-Barah, of Bakousah, the magnificent monument of Déir-Semaân are classical in their general composition, but in the details a new sentiment of art is perceptible; in the arrangement of arches and their supports; in the execution of the ornamentation, flat and cut up; geometrical figures mixed up with a vegetation of conventional leaves; the germ of the principles, which later produced the art of the Byzantines and Arabs, and which still later influenced and predominated in the various developments of the Roman style in Italy, Germany, France, and England.

In the mountainous regions between Antioch, Aleppo, and Apamea, on the right bank of the ancient Orontes river, there exist the remains of buildings and entire towns, almost untouched; or, at least, all the parts of which exist, sometimes thrown down from various catastrophes but never dispersed. These reveal to the traveller's view all the secrets, as it were, of a civilization long since passed. He passes along deserted streets; enters abandoned courts, and sees porticoes, where the vine twines its tendrils round the shafts of the columns still standing though mutilated.

He experiences the same emotions as when visiting Pompeii; less complete, perhaps, for the climate has not so well protected the ruins of Syria as the ashes and lava of Vesuvius have preserved those of Pompeii and Herculaneum. But a newer field of contemplation presents itself, for it is less known than the civilization of the Augustan period. In fact, all these cities, to the number of more than 150 upon a square area of 30 or 40 leagues, present a chain of monuments, regular and consecutive, belonging to the same system, the same epoch, namely that of Primitive Christianity from the fourth to the seventh century of our era—the least known of our art. Here one is transported into the midst of early Christian society and habits of life; not the hidden, degraded, timid, suffering existence of the catacombs, as we generally regard this early period of the faith, but an opulent, generous, artistic life; large houses built of squared masses of stone, with all the comforts and elegancies of covered galleries and balconies, fine gardens planted with the vine, presses to squeeze the grape, and tanks to receive and store the juice; large subterraneous cellars, stables for horses with their stone fittings; noble courts and open places surrounded by porticoes; elegant baths; magnificent churches with columns, flanked by towers, surrounded by splendid tombs.

Crosses and monograms of Christ are carved in relief upon the greater part of the doors, and numerous inscriptions are read upon the monuments, not containing the names of persons but pious sentences, passages from scripture and dates; the tones of these inscriptions indicating an epoch near the triumph of the church. By one of those phenomena of which the East offers frequent examples, all these Christian towns have been abandoned and devastated at once, probably at the barbarous invasion of the Mussulman and have not been since touched! Were it not for subsequent earthquakes, which have thrown down some of the walls and columns, nothing would be wanting but the carpentry of the construction.

Such are the remarkable pictures, which these regions of Syria present. They possess not the pure monumental edifices of Classic Greece, Asia Minor or Rome, but they furnish us with archæological elements for the classification of ancient buildings of a peculiar period of art, based upon facts and dates that are incontestible. In the three centuries, that at Rome bad churches were built from the ruins of anterior edifices, ill put together and without any order, in the Haurán and about Antioch the construction consisted of blocks of stone, varying from 4 feet to 12 feet long,—doors were cut out of the solid stone,—windows in blocks of basalt,—houses were surrounded by two tiers of colonnades, the columns consisting of monoliths, 12 to 18 feet high, and the capitals carved in an altered style it is true, but still vigorous and original.

Explorations in these countries had hitherto been accomplished under great difficulties and considerable danger, owing to the rapacity and hostile attitude of the tribes, who occupied them; but these were now yielding to the advance of Western civilization, and it is to be hoped that ere long it might be as easy to visit those parts as the more accessible regions of Greece and Turkey. Already a missionary stated, in a recent number of the 'Missionary Intelligencer,' that after a tour in the Haurán he had returned to Damascus, when he was transported to Beyrout on the coast in only ten hours, in a *French omnibus!*—hitherto a fatiguing journey that occupied three days on horseback.

The President then pointed out the illustrations as they were arranged on the walls, enlarged from the engravings, with which he had been favoured by Monsieur de Vogüé, and giving a succinct explanation of each.

Mr. **Fergusson**, Fellow, begged leave to propose a vote of thanks to the President for his very valuable communications. He might be allowed to add a word with regard to the *personnel* of these discoveries. About two years ago M. Rey, a French gentleman, had commenced the publication of a folio work upon the buildings discovered in the Hourán, and as far south as Gerash; another work on the same subject had been published in 1860 by Mr. Wetzstein, the Prussian consul at Damascus. Those explorations were between the dates of those of Porter and that of De Vogüé. Mr. Waddington, who had been referred to as having accompanied De Vogüé in these explorations, was the son of an

English gentleman settled at Rouen, who married a French lady, and whose children were brought up as French subjects. Mr. Waddington was a young man brought up in France, and had travelled a good deal with De Vogüé. In the exploration alluded to, Mr. Waddington devoted himself principally to the inscriptions, and De Vogüé to the drawings; and he believed they brought home with them as many as 600 inscriptions from those parts, the dates of which ranged from the time of Pompey to the time of the Mahomedan conquest. In fact, that country was the great highway between the East and the West, from the time when the Romans got possession of it till the Mahomedan conquest cut across that line of commerce. It was from one century before Christ to the seventh century that all these cities were built, and they bore inscriptions ranging through that period. He believed the whole of the buildings found there belonged to that date—the earliest were Greek and Roman, and subsequently the Byzantine. It could not be questioned that the researches of De Vogüé would form a valuable addition to our knowledge on this subject. He might add that that gentleman was bringing out a large work upon Jerusalem, the result of three years' explorations in that city; and the first number of that work might be expected in the course of a few weeks.

With respect to the first communication with which the President had favoured them, he thought Covent Garden Theatre had suffered in the comparative dimensions given in regard to the width of curtain. The width of scene in Covent Garden, he believed, was 47 feet, instead of 40; that of La Scala 49 feet, instead of 45; and that of St. Petersburg 52, instead of 45.

The figures were given in his own work, from a table given in M. Clement Coutant's "Parallèle des Theâtres Modernes." With regard to the auditorium in the New Opera of Paris, it was small compared with other theatres, being calculated to contain only 2,000 persons, while that of Covent Garden was 2,500 and Drury Lane 3,000. He would not, however, extend these remarks further, as the object for which he rose was to propose a vote of thanks to the President for his interesting communications.

The area of La Scala was about 40,000 square feet, while that of the New Opera was 100,000 square feet. Of the other first-class lyric theatres 40,000 was about the largest, and they decreased from that down to 20,000 square feet.

Mr. JOHN W. PAPWORTH, Fellow, said, if the observations he was about to make did not seem to entirely agree with those of the President, they must not invalidate the good will, with which he seconded the vote of thanks. With respect to the plan of the New Opera at Paris, which the President's observations might be construed to present as a model for a theatre, Mr. Papworth would not deny to that plan the merit of providing for an opera house a vast crush room, screened from the external air by the vestibules; in fact, securing to a quiet crowd a comfortable promenade during the intervals between the acts, and an easy exit to its carriages. But in comparing that plan with the requirements of an English theatre, where the great difficulty was to accommodate the entrance of a crowd, he would notice that the plan before the Meeting seemed a waste of building, because so large an amount of reception room resulted in the creation of a crowd three or four times over inside the walls instead of one outside. The moment the crowd passed the first barrier or check, it would meet with a second. Then followed a passage of 30 feet wide, which was space enough to accumulate a fresh crowd, and the whole of these checks and passages resulted in the audience being let through five doors into the staircases and passages of the auditorium. It is true, as the President observed, that there are entrances at the sides in the New Opera. Another remark was to be made with respect to the great width given to the stairs. If the stairs were only 5 feet wide, the crowd would get in and out better. It was quite true there were side doors in the New Opera, but he felt that the best mode of admitting and letting out a crowd depended on the primary arrangements: if the crowd were to stand in the open air, it would best be subdivided by letting it pass through a range of deeply embrasured narrow doors, at no great distance apart, into a *queue* working round the passages admitting to the staircases, and instead of one vast staircase, half a dozen small staircases would be preferable. If the crowd were to stand under cover, it would be best to divide the portico in a similar manner, forming a *queue* working through doors at a great distance apart into the passages admitting to the staircases. As to comparisons of the width of stage, he had previously expressed an opinion that it would be much reduced when the time should come that the action of the performers was again considered of importance. It was very well where singers occupied the centre of a stage advanced into the auditorium to have a wide proscenium; but when it became so large as in this instance, the scenery of interiors could rarely be at all suitable to the scale of the human figure. Of course, where a building was intended for operas, *i. e.* almost solely for ballets, he could comprehend the necessity for a wide stage, and for great depth in behalf of the landscape scenery, which, in our present theatres, was lost to a large portion of the spectators. The great merit of the New Opera was the accommodation afforded between the side walls for the flies and the dressing rooms; this was not the case in English theatres, which, for the most part, had insufficient space for the machinery upon and beneath the stage. With respect to the 15 feet depth of passage behind the boxes in the New Opera, when they considered that the French boxes had a front and back box each, it might be deemed too large; but really it was not too large for people dressed in the present fashion. With regard to the works in the Haurân, it appeared that there must have been a main road leading from Busrah through Palmyra to the Euphrates, part of which was the route taken in 1782 by Sir William Donkin, whose description of buildings 1200 feet and 1000 feet square, in the desert, half-way between Palmyra and the river, was published in the fourth volume of the 'Asiatic Researches.' He called the place Castrohuoin; perhaps this was the Kasr Aukheim of the maps. It would appear from that fact, and from the names of places preserved by our geographers, that the country between the Euphrates and Emesa, taken as a point between the Chalcidice and the Auranitis, was occupied by buildings which now required discovery.

The **President** should have said that the great commercial city of Palmyra was the city of deposit, and was on the main line of traffic from the East to the West. The commerce which came overland from Aleppo came to that western coast of Syria, and was transported thence in the vessels of these cities on the coast into Europe, which produced the large wealth that distinguished those cities.

Mr. **Papworth** would remark, with regard to the cities of the northern portion mentioned by the President, that the province called Chalcidice by the Romans was more worthy of the attention of the Institute than its members generally might imagine. If Mr. G. R. Lewis's invention, about twenty years ago, of the term Christian architecture was desirable, and every member knew how much discussion that term had caused in its application, from its vagueness, the Auranitis was not such safe ground as the Chalcidice to mention as a country wherein would be found a peculiar phase of art which was literally and emphatically Christian architecture, if that term expressed the architecture invented and practised for more than three centuries by a people so truly Christian, and so free from all pagan impressions that they refused even to commemorate their names in the inscriptions upon their funeral monuments. In the Chalcidice the student would find something looking very like the germ of Byzantine, Arabian and Romanesque architecture, decorated by flat and pierced ornament of geometric figures, mingled with pointed leaves of conventional foliage, of apparently Eastern origin, applied to large stone-built houses, with galleries and covered balconies, in piazzas, containing churches with towers; and all this probably dated no earlier than the time of Constantine, and was supposed to have been abandoned during the first successes of the Mahometans.

The vote of thanks was passed, and another to Monsieur E. De Vogüé, for the illustrations furnished by him, after which the Meeting adjourned.

ERRATUM.

In page xxxii of 'Occasional Papers,' line 8, *for* Landiem men *read* handicraftsmen.

THE ARCHITECTS' BENEVOLENT SOCIETY.

PATRONS.

Sir Robert Smirke. | A. J. B. Beresford Hope, Esq.

PRESIDENT.

Sydney Smirke, Esq., R.A.

TRUSTEES.

Professor Donaldson, Member of Institute of France.
Philip Hardwick, Esq., R.A. | George Gilbert Scott, Esq., R.A.

. TREASURER.

William Tite, Esq., M.P., F.R.S.

COUNCIL.

Edward C. Hakewill, Esq.
T. Hayter Lewis, Esq.
C. C. Nelson, Esq.
R. Parris, Esq.
Richard Tress, Esq.
Joseph Clarke, Esq.
John Henry Hakewill, Esq.
Edward I'Anson, Esq.
Horace Jones, Esq.
George Mair, Esq.
John Barnett, Esq.
Robert Kerr, Esq.
Geo. Ostell Leicester, Esq.
Henry Mawley, Esq.
T. P. St. Aubyn, Esq.

HONORARY SECRETARY.

John Turner, Esq.

REPORT

Read at the General Meeting of the Society—March 9th, 1864.

The period has again arrived when it becomes the duty of the Council to report progress to the general body of Members, and to submit a statement of the financial condition of the Society.

The Council apply themselves to the annual task with mingled feelings of pleasure and pain.

It will be seen by the Statement about to be laid before the Meeting that the amount of subscriptions received during the past year exceeds that of the preceding year, and the arrears due are very considerably less. The demands, however, on the Charity have been heavy: Fourteen cases have been relieved, and the sum of £258. has been distributed; a much larger sum than the Council has ever yet found it necessary to so appropriate during any one year. On the other hand it must be stated that the number of members has diminished by four. Considering the rapid increase in the number of those who pursue our profession, it seems a sad reproach that such should be the case, and that this Society, founded on the purest motives, and whose funds are administered with the most scrupulous and unremitting care, should be left with such restricted means. During the past year we have sustained the loss of three distinguished members.

It is with deepest regret that we have to record the death of one of our earliest, warmest and most liberal supporters, Mr. Cockerell. In his death the Profession has lost one of its greatest ornaments, and this Society, one of its most valued friends. It is with grateful feelings that the early members recal to mind the earnest and hearty personal interest he took in the foundation and establishment of the Society, and the constant friendliness that he felt and repeatedly expressed towards it during its whole course. In the deaths of Mr. Bunning and of Mr. Scoles the Society has also lost two among its much-honored members.

It is with societies as with individuals; we can feel the loss of our earliest friends with the keenest regrets, for they leave a void behind them which cannot be fully replaced.

Among the cases relieved during the past year several have occurred of great interest. One who was a Gold-medal Student of the Royal Academy, and has since lived an active life under favorable auspices, yet now, when upwards of eighty years of age, is wholly without means of subsistence. Another most deserving case is that of a gentleman more than seventy years old, who, without stain on his character, is penniless. Widows equally destitute, yet with large families, are also on our list of recipients. The perpetual recurrence of new cases such as these, and indeed their apparent increase in number, invite our most serious consideration.

It may be assumed, probably, that the profession never held so important a position in this country as it holds at the present time. Owing to the general prosperity of the people new buildings are rising in every corner of the kingdom, and few are now erected without the aid of the architect. This was not formerly the case. Æsthetic considerations used rarely to enter into men's minds, except when some great public work was about to be undertaken, and the result of this general want of consideration for art is very apparent in the poor and insipid character of architecture at the close of the last century in this country.

Those times are passed away. The general public have learnt what sort of client the man usually has who is his own architect, and hence the horizon of our art brightens.

But let us not be too jubilant. Let us not, in the midst of comparative prosperity, forget the duties that prosperity brings with it; nor shut our eyes to the sad sights of distress that lie ill concealed beneath the surface of professional life. How many of our brethren are pining in want and sickness whilst we are in ease and comfort! We should indeed regard it not as a mere duty, but as a privilege, to help to soothe the sorrows of these unfortunate persons.

Remember that we have it from the most unerring source that "without Charity we are nothing worth." Were this truth more practically felt by our profession, especially by those who are practising in the great provincial centres of the country, we should no longer have, from year to year, to urge on them so earnestly as we do the claims of this most excellent Institution.

COLLECTOR.

Mr. ALFRED HILL, 38, *Tonbridge Street, Euston Road.* W.C.

Gentlemen desiring to become Subscribers will be so good as to communicate their wishes to the Hon. Secretary, 15*a*, *Wilton Street, Grosvenor Place;* or to Mr. ALFRED HILL, the Collector, as above.

SOME REMARKS UPON THE WORKS OF THE EARLY MEDIÆVAL ARCHITECTS, GUNDULPH, FLAMBARD, WILLIAM OF SENS, AND OTHERS.

By Benjamin Ferrey, F.S.A., Fellow.

Read at the Ordinary General Meeting of the Royal Institute of British Architects, April 18th, 1864.

The enquiry I am about to suggest in the few observations I shall address to you, is one I believe that has never formed a field of investigation either with architects or antiquaries, but is a subject which I think may fairly occupy our attention; and in the course of the examination some facts may be elicited tending to show the practice of those who exercised our art during the rise of the Mediæval styles, which reached their culminating point in the sixteenth century.

The many dissertations which have been written upon the origin and progress of the Mediæval styles all dwell upon the successive changes in expression and advancement of mechanical skill in construction, without enquiry into the names of the distinguished men by whose genius Mediæval architecture gradually acquired an excellence equal, if not surpassing that of the great Classic school; whereas the history of classic architecture, on the contrary, supplies not only the several steps by which it obtained excellence, but also the names of the chief architects who became the founders of distinct rules for the use of the orders according to their several modifications upon the antique models. Mediæval architecture is entirely wanting in records of this kind, and has but slender traditional information by which to ascertain the authorship of any one of the four distinct styles which prevailed throughout Europe from the eleventh to the fifteenth century,—not only are the inventors of the styles (if they may be so called) unknown, but the names of the builders of many of our most interesting churches cannot be discovered owing to an entire absence both of historical and traditional information on this head. If we except the founders of some of our cathedrals, whose names are fortunately mentioned, it may be said that the great multitude of our churches are built by men utterly unknown.

Of the exception to this rule I will notice a few examples, where either by incised inscription on stone, or brass, or inserted flint work, mention is made denoting in whose honour the fabric is raised, and couched in some devotional phrases ascribing praise to God. Thus in the case of Valley Crucis Abbey, near Llangollen, across the gable of the west front is inserted this fact:—" Adamus Abbas fecit hoc opus in pace quiescat. Amen." In the tower of the Church of Wanborough, near Swindon, is a brass plate thus inscribed:—" Orate p. Thoma Polton e Editha ux. e ei defunctis. Mag. 20 Philipo Arch. no. Glouceste. Agne et XIIII alius eor alius. Dns Everard Vicaria e obs suis pocheais. g. h. Campamile ixerpit Ann° Dom. 1435. Rendered—" Pray for Thomas Polton and Editha, his wife, defunct; for Master Philip Archdeacon of Gloucester, Agnes, and fourteen others his children. For Sir Robert Everard, Vicar, and all his parishioners who this tower commenced, Anno Dom. 1435." Again at Lavenham Church, Suffolk, the founders of a side chapel are thus commemorated:—" Orate pro anima Thomæ Spring et Alicia uxoris ejus qui istam capellam fieri fecerunt A.D. M.CCCCC. vicessimo quinto;" and a few other like inscriptions are met with, some indeed very quaint, and made the vehicle for punning upon the name, as at Christchurch, the Chauntry Chapel of Robert Harys, erected probably in his lifetime: here his name is sculptured upon a shield within one of the quatrefoils of the basement panelling, viz., an initial R. with a hare below it in a cumbent posture, from whose mouth issues a label marked with the letters ys. The same rebus may be traced in other shields, and on a carved scroll, entwining a gnarled stick or rod in the stringcourse, is the following inscription:—"The Lord King of Bliss, Have mercy on him that let make this, the which was Robert Hary's, M.CCCCC.XXV." At Melford Church, Suffolk, the pious benefactors concerned in the building may be known by the inscription under the battlements and windows, as follows:—"Pray for the soul of Robert Sparrowe and Marion his wife, and for Thomas Cooper and Margaret his wife, and Roger Smith, who with the help of the well disposed men of this town did these six arches rear, Anno Dom. M.CCCC.XI." Records of this kind are however very rare, and as regards the greater number of our noble Mediæval structures we are left in total ignorance of the persons by whose genius they were erected.

How strikingly does this reticence on the part of the great artists of olden times contrast with the desire for notoriety amongst men of the later ages. How frequently does it happen in examining post-Reformation works that one finds both the heraldic achievements of the founders and the quality of the architect too carefully preserved, while the yet remaining traces of the ancient building, sufficient to attest its superior workmanship, are the only evidences of an earlier building of great beauty, concerning which we literally know nothing. Those architects whose professional duties have called them to the careful examination of ancient work, can bear witness to the intense pleasure they have felt while sketching and studying the ingenious devices by which difficulties have been overcome and beauties produced out of accidental circumstances, evidencing a degree of genius worthy of all praise; how they long to render homage to the honoured name of the author of such constructive skill, and could almost idolize the artist if only known; and yet no clue of any kind has been found by which to ascertain the name, and transmit it for admiration to future generations.

Now I think, although it may be impossible to find out and identify every great ecclesiastical work with some well know Mediæval architect, yet a skilful process of examination may be set on foot through which we may with much probability discover who were the builders of many of our churches, and show by the unerring mark of the artist's own hand how possible it is to detect his work. Once having ascertained the manner and leading principles which guided some of our great ecclesiastical architects, a close comparison of the details of the several buildings in each diocese may result in showing such remarkable similarity as may only be accounted for by assigning the authorship to one man.

Those accustomed to the examination of country churches in the neighbourhood of the great cathedral cities must have been struck with certain resemblances and repetitions of portions taken from the cathedral church, but executed in an inferior manner, showing a want of delicacy both in the mouldings and carvings. There can be little doubt that the art workmen engaged on the cathedral were also employed in building the parochial churches affiliated to the mother church, and naturally copied or took the details of the greater work for their type; this can easily be detected by the want of that life and spirit stamped upon the details of the lesser building, sufficient to show that the performance was not the production of the master mind, but of a subordinate hand. Instances of this sort may be found in some parts of the Church of Wookey, near Wells, and in the tower windows and other portions of the Church of Stoke sub-Hamdon, in the diocese of Bath and Wells. Again, in the diocese of Salisbury the Church of All Cannings shows some remarkable resemblances to parts of the cathedral, and other examples could easily be cited. These inferior imitations may easily be distinguished from the rich and beautiful details of the larger buildings, and it is in these higher class of churches that we may expect to find the indisputable evidence of authorship for which I am contending.

Commencing the enquiry, then, by selecting the accredited works of the following distinguished men, we shall find how completely the theory I have asserted is proved by a comparison of the buildings they erected in different places. I shall pass over the period anterior to the Norman Conquest, as so much difficulty presents itself in ascertaining with any degree of certainty the actual buildings in England which can be assigned to that date, and notice the works of Gundulph, Bishop of Rochester; Ralph Flambard, Bishop of Durham; Llanfranc, Archbishop of Canterbury; William of Sens; Leffrid, Bishop of Chichester; Henry of Blois, Bishop of Winchester; William of Wykeham, Bishop of Winchester; and Sir Reginald Bray.

First, as to the buildings erected by Gundulph, Bishop of Rochester, and here on the very threshold of the enquiry we are met by the difficulties which belong to snbjects of this kind; for recently, doubts have been raised as to the authenticity of buildings hitherto attributed to Gundulph. Historians and antiquaries have so much adopted the opinions of their predecessors, repeating their statements, without making examinations and investigations for themselves, that the public (led by them) have hitherto implicitly believed Gundulph to be the builder of Rochester Castle, and until lately nobody has ever doubted the fact; but it now appears, after the most careful researches, that Rochester Castle (at least the superstructure) belongs to a period a full half a century later than Gundulph's time. The Rev. Mr. Hartshorne, in a most able paper read before the Archæological Institute, last August, at Rochester, produced documents showing that the Castle was erected by Archbishop William de Corbeul in the years 1123 to 1139,* but the language of the deed from which this fact is established leaves it doubtful whether the basement of the Castle might not be of earlier date; and a fair comparison of Gundulph's authenticated work at Malling Castle with the fragmentary portions of the early Norman work in Rochester Cathedral and the parts of the basement of the Castle, show such a marked manner in the masonry and jointing so entirely unlike the other Norman portion, that one cannot err in ascribing the work to one and the same hand; in the very mortar there is a peculiarity not met with usually in Norman work. Both at Malling and Rochester the mortar consists of a sort of tuffa, found only in the Cliffs of Dover; this material appears to have been exclusively used in the work by Gundulph. The later construction has no such distinctive quality, and is of the ordinary Norman character.

A difficulty of another kind has been raised, in which it has been gravely questioned whether Gundulph really possessed such skill in architecture as to render it probable that he designed and superintended the works ascribed to him at all; in truth, whether he was more than the presiding Bishop of the Diocese at the time when the Cathedral works were going on, the buildings being erected by some master mason, and carried out by him during the episcopate of Gundulph. Now without attempting here to enter upon a topic which has been so much agitated lately, tending to throw doubt upon the received opinions concerning the founders of some of our great ecclesiastical buildings, it certainly may be safely assumed that Gundulph was distinguished for his skill in building, for Ernulphus, his successor in the See of Rochester, says of him, "Gundulphus in opere commentarii plurimum sciens et efficax erat;" expressions which could certainly not be applicable to him merely in his episcopal capacity, but which pointedly refers to his constructive skill; and why should any one be desirous of depriving Gundulph or his ecclesiastical successors of the merit which belongs to them in connection with the great works associated with their names? Education in those early times must have been limited. The laity had too much occupation in feudal contests in the protection of their homes to prosecute the study of art or science, and those tranquil pursuits were necessarily restricted to the cloistered brethren, whose undisturbed lives gave them opportunities for cultivating the sciences, and whose religious zeal, and the desire of increasing the splendour of God's house, naturally led them to the practical exercise of architecture.

---

* In the Chronicle of Gervase, the faithful historian of the Cathedral, he states that King Stephen gave and confirmed to the Church of Canterbury and to William the Archbishop the Castle that was in the City of Rochester, where the same Archbishop built an extremely beautiful tower. This valuable passage is conclusive, and removes all doubt of its author from dispute.

Gundulph, originally a monk of the Abbey of Bec, in Normandy, was invited by Lanfranc, Archbishop of Canterbury, to England in 1077, and by that prelate's influence raised to the See of Rochester. The incidents in the life of this eminent ecclesiastic have been most graphically described by the Rev. Dr. Hook, the learned Dean of Chichester, in a paper read by him before the Archæological Institute at their last Congress at Rochester. The tastes of the patron and protegé were congenial, and we may easily imagine that the Archbishop saw in Gundulph the capabilities for architecture which might be exercised with advantage in the growing wants of the Anglican church.

Gundulph was born in that part of Normady called the Vexin. As he died in 1108, being then in his eighty-fifth year, we may fix the date of his birth somewhere in the year 1023. Of his family little is known. Gundulph received his primary education in his native place, and when he had mastered all the learning he could receive at home, he was removed to Rouen. Here his good conduct did not escape the observation of William Archbishop of Rouen. From Rouen he was induced to make a pilgrimage to the Holy Land, where he encountered many hardships, and on his return was nearly shipwrecked; in gratitude for his preservation he resolved to devote himself to a religious life, and entered the monastery of Bec, in Normandy, where he became a Benedictine monk. Here he formed the friendship of the good and learned Anselm. Gundulph appears to have been of a most sensitive disposition. Dr. Hook observes, when giving many incidents of his life, that there is nothing more remarkable in the history of Gundulph than "his copious weeping;" he seems to have encouraged it as a virtue. In every respect his character as an ecclesiastic contrasts favorably with Flambard. He possessed as many good moral qualities as Flambard was cursed by bad. While Gundulph was sacrist works on a large scale were being carried on at the Monastery of Bec, and this practical man was thus directed to the study of architecture. Had he commenced those studies sooner he would probably have profited by the specimens of Saracenic art which must have met his eye in the East, but we do not trace the influence of his travels in any of the works in which he is said to have been concerned. It was no doubt on the ground of his skill in architecture, that when the Prior of Bec became Abbot of St. Stephen's, in Caen, he sought the assistance of Gundulph. The migration of Gundulph to Caen took place about the year 1066. The works at St. Stephen's were incomplete, therefore he could pursue his architectural studies, and obtain that practical knowledge which he afterwards turned to good account. Gundulph followed the fortunes of Lanfranc, and when Lanfranc was settled at Canterbury he sent for Gundulph, who aided him in his architectural works, and was otherwise employed by him in important negotiations. Meanwhile higher honours were in store for Gundulph. The See of Rochester was vacant. The Archbishop in relation to this small See stood in the position of the king, and through Lanfranc's liberality the bishopric was conferred upon Gundulph. He found the cathedral in such a state of dilapidation, that repairs would be useless. Gundulph offered to procure the funds, not only for rebuilding, but also for increased endowment of the church. In his own person, notwithstanding his engagements as a bishop, an architect and a politician, he exhibited as far as circumstances would permit a model of monastic propriety; he did not permit his monks to eat the bread of idleness, and some of them rendered him assistance in his great architectural works. Gundulph now assumed that character by which he is best known in modern times—the character of an architect. How far his scientific knowledge was employed on those buildings which were erected under his eye at Bec, at Caen, and at Canterbury we are left to conjecture. I am indebted to the Dean of Chichester for these brief notices of Gundulph's career, and to those who take an interest in biography

I heartily recommend the perusal of his learned and amusing paper, which will shortly be published in the transactions of the Archæological Institute. Dartford Church and Darent Church are also said to have been built by Gundulph. The tower of Dartford agrees so closely in character with his other buildings that there can be little doubt it was erected by him, but the Church of Darent does not present the same unmistakeable evidences, and I agree with Mr. Parker that this building is of later date. There is, however, another building, Leeds Church, the masonry of which is so like that of Malling and the tower of Rochester that I think it may be viewed as the work of Gundulph. The White Tower of London, being one of Gundulph's last works, shows much more finish in its details, and is less rude and rough in its construction than the buildings which he erected in Kent, where having to deal with a rough rag stone, the work is less finished.

One of the earliest instances of the manner in which the Norman architects repeated themselves is given in Professor Willis's "Architectural History of Canterbury Cathedral." Speaking of Lanfranc, and the buildings which he erected at Canterbury, he says :—" Now Lanfranc, before he was made Archbishop of Canterbury, was the first abbot of the monastery of St. Stephen's, at Caen, the church of which was built under his direction; begun in 1064, and dedicated 1077, after his appointment to Canterbury." The two churches were therefore in building at the same time. The church of Caen, like that of Canterbury, has had its original choir replaced by one in the style of the thirteenth century, probably for a similar reason—enlargement. The portions which it retains are alike in plan and arrangement to the corresponding parts of Canterbury; alike in the number of piers; in having western towers, transepts without aisles, a central tower, eastern chapels to the transepts, and the pillars and vault at the end of each transept; nay, even in dimensions they are, with slight difference, the same. The breadth between the walls of St. Stephen's is 73 feet, which is one foot greater than at Canterbury. The extreme length of the transept is 127 feet; also that of Canterbury is the same. The width of the central alleys was apparently less at Canterbury than at Caen. We cannot now tell whether this singular, and I believe hitherto unnoticed, resemblance between the two churches extended also to the elevations, for no fragment remains at Canterbury from which to judge, except the western tower, which is not the same in decoration; but, as western towers were the last things finished, deviation might have occurred here, although the rest was the same."

The next example which I shall mention where a close resemblance to an architect's other works is to be traced, may be found by comparing the works of Bishop Ralph Flambard, a distinguished architect, contemporaneous with Bishop Lanfranc. Flambard was a native of Bayeux, in Normandy, and his ultimate advancement in England to the princely bishopric of Durham, by the favour of William Rufus, was remarkable. He filled so important a position in his day that a sketch of his character must not be omitted when noting his works, and I will avail myself of the very graphic account of his life as drawn by the Rev. Mackenzie Walcott for introduction here. He says :—" Ralph Flambard, or Passeflabere, was the son of Thurston, a village priest of Bayeux, and his mother was reputed to be a witch, and familiar with demons. The Saxon chronicles say that, as justice of Eyre, he held the gemot, or King's court, throughout England. He was the first author of a work in English law ; and, singular to say, Leland mentions that the library of Christchurch (of which he was dean) contained only a single volume of Saxon laws. Henry of Huntingdon and Odericus say that the king called him Flambard (devouring flame) from his insolence. He, however, appears under that name as a land-owner in Doomesday. He lessened the estates of the farmers, and was execrated for his exactions. With his brother Fulcher, the infamous Bishop of Liseux, he distrained the rents and property of English bishops. On the death of his brother Fulcher, he endeavoured to obtain the see of Liseux for his son Thomas. His son Elias succeeded him in his stall at Lincoln, and he had a brother named Geoffrey.

He was vicar of Godalming, chaplain to Bishop Maurice, of London, and the King, Prebendary of Lincoln and St. Pauls, Procurator-General, Chief Justiciary, Lord Treasurer to Henry I., Prime Minister, and a most unprincipled courtier. In 1099, Ralph was consecrated Bishop of Durham, on June 4th, in St. Paul's cathedral, having previously been compelled to give £1000 to the king for his promotion. In 1088, the king gave him the chaplaincy to the abbey of Winchester; in 1089, the archbishopric of Canterbury, when, to secure his promotion, he gave the king all he could; in 1092, the bishopric of Lincoln and abbey of Chertsey. He was the most subtle of men in evil; he robbed every church under his charge, and reduced rich and poor to such indigence that they preferred death to life under him. In 1095, the kingdom was entrusted to him, while he held sixteen churches, cathedrals, and abbeys, without bishop or abbot, which he reduced to the depths of poverty. He invented new offences in order to create fines; introduced money compensations for crimes; and, like a true Erastian, recommended that temporalities during the vacancy of a see should devolve on the crown, while he made simonical contracts with aspirants to the mitre before he would recommend them to the king. One archbishopric, four sees, and eleven abbeys were in consequence kept in the king's hands for years, and remained unfilled. He was committed to the Tower, where he was allowed two shillings a day (equal to thirty shillings sterling), on a charge of malversation, August, 1100; but he contrived to intoxicate his keepers, and escape by means of a rope, which had been concealed in a pitcher of wine, on February 4th, 1101, cutting his ungloved hands to the bone in the act. He fled to Normandy, where he endeavoured to incite Duke Robert into rebellion, and accompanied him in his invasion: he was restored to his see in 1107, after the retirement of that prince. Finding that his death was approaching, he caused himself to be carried into the minster, and, by offering of a ring before the high altar, made restitution to the prior of several possessions and privileges which he had detained by violence. He died September 5th, 1128, and was buried at Durham cathedral, the nave of which he built. He was a great architect, and besides the nave of Christchurch and Durham, he erected Norham Castle, Mottesford Priory, county of Lincoln, and Kepyer Hospital, Durham.

I could not resist giving you this biographical sketch of one of our greatest ecclesiastical architects of the twelfth century. With his moral character, however, we have nothing to do, and though we may execrate his vices, we are not at liberty to repudiate his surpassing skill in science and art, on which I now proceed to speak. Of his castellated buildings there is not much to say; time and its attendant vicissitudes have robbed the building of all its prominent architectural features, and little can be discerned to identify the castle with its first builder. Successive Bishops of Durham from time to time strengthened this border fortress, and increased its fortifications. Shattered and dismantled it now stands—a majestic ruin—distinguished by its grand position in the far-famed charm of Scotland's poet:—

> "Day set on Norham's castled steep;
> On Tweed's fair river, broad and deep—
> And Cheviot's mountains lone.
> The battled towers, the donjon keep,
> The loop-hole grates where captives weep,
> The flanking walls that round it sweep,
> In yellow lustre shone."

We have it upon undoubted historical evidence that Hugh Pudsey, Bishop of Durham, received orders from King Stephen to build a castle upon the Tweed at Norham, which had formerly been erected by Bishop Flambard, and destroyed by the Scots; the remains, therefore, we now see, and which evoked the spirited lines above quoted, are probably only the ruins of the later castle erected by Hugh Pudsey, who, indeed, was little inferior as an architect to his notorious predecessor Flambard.

It appears that Flambard was elected Dean of the Priory Church of Christchurch, Twynham, at the latter end of the eleventh century, and contemplated the entire rebuilding of that church upon an enlarged scale, but his rapid promotion prevented the fulfilment of his intention; he, however, built the fine Norman nave and transept, and had commenced other works there, which were suspended on his removal, and subsequently completed in the early English style which so soon followed.

A description of the noble nave of Christchurch is here desirable, in order to show the distinctive character of Flambard's architecture and the dissimilarity of his style from other great Norman works then constructing in England, and also to identify his detailed manner both at Christchurch and Durham. The nave of Christchurch consists of seven bays; every bay is divided by a clustered group of semicircular shafts, separated by square piers, each shaft having a capital ornamented with the peculiar foliage resembling the Grecian honey-suckle, these again carrying semi-circular arches slightly, stilted with square and semi-round members corresponding to the shafts below. Two of the shafts facing the nave and dividing the bays, rise through the triforium and terminate a little short of the clerestory, where some transitional corbels of peculiar form, grafted upon the Norman shafts, form the springers of early English vaulting. The spandril walls of the lower arcade are ornamented with hatch-work and fish scales; a stringcourse of chevron-ornament crowns the arcade, whence springs the triforium, each bay containing double engaged circular columns, carrying a bold semi-circular arch, enclosing coupled arches in a second order resting on a central column and corresponding engaged shafts.

The peculiar feature of this design consists in the point at which the groining springs, being some feet below the path of the clerestory or upper wall passage. As a general rule the groining springs on a level with the clerestory, whereas both here and at Durham the vaulting starts from an unusually low position. It is somewhat remarkable that neither at Christchurch nor Durham did Flambard complete the clerestory or groining. The manner of Flambard is at once original and marked, both at Christchurch and Durham he adopts the same peculiarity.

Again, in comparing the aisles of the two churches it will be seen that the wall spaces under the windows are ornamented by bold arcades, both within and without. At Christchurch the inner arcading consists of semi-circular arches on detached round shafts, and externally are discoverable (though covered by later work) the traces of bold intersecting arches and columns, such as may be found all round the north transept. At Durham, by way of difference, the reverse arrangement occurs; internally we have the intersecting arches, and outside the range of semi-circular arches on single shafts. Nor do general resemblances end here; in the mode of lighting the triforium we perceive the identical disposition of single light windows, and attached to the rear of the great piers are well defined flat projections, with corresponding projections against the outer walls, evidently built to receive semi-circular arches, which by their bulk should act as counterforts to groining. At Christchurch the piers only are executed, but they are finished with a well moulded abacus; at Durham, where the arches are completed, this feature is wanting, but I think these preparations may be taken as conclusive evidence that Flambard intended each building to be groined, though this particular work was not carried into effect in his day, but somewhat later. So far, in many respects, the works of this great architect carry the impress of his manner, and in noticing the points of departure we observe that they are such as would follow in consequence of the increased scale of the cathedral over the conventual church.

The nave of Durham is one of the most grand and imposing interiors in this country. The introduction of the massive cylindrical column alternately with the clustered piers is most happy in effect. Flambard did not live to carry out his full intention at Durham, either by stone groining or flat ceiling, as at Peterborough, yet the preparations above alluded to show what he would have done; and we cannot but commend the good taste of his successor, Prior Melsonby, who notwithstanding the change of style which had taken place, and the prevalence of the pointed arch in his day, yet still availed himself of the semi-circular instead of pointed vaulting, and thus completed the work of Flambard in one homogenous style.

By the way, I may mention another instance of this deference to the intention of a previous architect, though of much later date; it occurs in the cloisters of Norwich Cathedral. These cloisters were commenced by Bishop Walpole in 1297, but his death took place before he had proceeded far with his work. Richard Uppingham, who succeeded him, built three compartments more; he was followed by Bishop Salmon, who erected five compartments, with the whole of the south wall. The north wall, forming the completion of this famous cloister, was effected in the time of Walter Worsted, Prior of the Church, in 1430. Yet though this cloister was built at different times and by different persons, we find a general uniformity of style prevail in the details of the columns, capitals and groining, and even to many of the mouldings of the four sides. This was certainly not the usual practice of those times; each man generally built his portion in the advancing style of his day, without regard to congruity with the work of his predecessor, and so marked a departure is deserving of special notice. But to return to Flambard. There is another kind of external decoration, both at Christchurch and Durham, in the bold lattice or reticulated work, which is evidently peculiar to him. In the round turret of the north-east angle of the north transept of Christchurch this lattice work ornamentation is most striking and effective; it is really like a net formed by large ropes girting the masonry and holding it together. Its application to a round structure on such a scale is perfectly unique, and it is difficult to resist the supposition that some kind of symbolism was intended by the composition: the spandrils of the intersecting wall arcade are wrought with the fish-scale and herring-bone channelling, while the twisted columns by their varied convolutions seem borrowed from the shells abounding on the shores of the sea close by. The gable of the south transept of Durham Cathedral is filled with this net-work device, and also the lower stage of the west end of the Galillea Chapel. I am not aware that any other Norman building possesses this ornamentation upon so large a scale; there is a little of the kind in the south front of Rochester Cathedral, but so diminutive in its proportions that it merits little notice. In the drawings of the compartments of the naves of Christchurch and Durham will be observed the close resemblance which exists between them, and by contrasting them with those of Romsey Abbey (not far from Christchurch) and the Cathedral at Oxford, it will be apparent how totally unlike they are to each other in all respects, and how completely the former work is the production of a different mind.

The next remarkable example of close resemblance between the works of the same architect belongs to the period of the thirteenth century, when the first pointed style had become generally developed in England and France. Here again I shall refer to our greatest authority in the discrimination of works belonging to different periods. Professor Willis having unravelled some of the most difficult problems which before his time had puzzled antiquaries, who for the want of scientific knowledge so largely possessed by Willis, could only hazard conjecture upon the ages of ancient workmanship. The Professor, bringing to bear upon these subjects a great amount of practical knowledge, has placed beyond the possibility of doubt the correct lines of demarcation between masses of masonry welded together at different periods, and presenting to the less informed archæologist matters of doubtful date.

In reference, then, to the portions of Canterbury Cathedral built by William of Sens (not William the Englishman), for two architects named William were employed in succession upon the Metropolitan

Church; Professor Willis remarks: "It is certain that the pillars to the choir, with the pier arches and the clerestory walls above, are wholly the work of William of Sens." This result the Professor arrives at from the internal evidence which the building affords, and by the aid of the historical account of the rebuilding furnished by Gervase the Monk, of Canterbury. Let us now see how far this assumed work at Canterbury harmonizes or corresponds in character with other buildings designed by William of Sens elsewhere. Referring, then, to the Cathedral at Sens, a considerable part of which was designed by him, we are struck at once with the close resemblanee between the choirs of Sens and Canterbury both in plan and elevation; each terminate in an apse of seven sides, the compartments are separated by single round pillars, having bold capitals with square abaci carrying simple but effective moulded arches: above are the openings of the triforium, each bay comprises two arches and pillars in a secondary order; above is a lofty coupled clerestory window, filling up the bay of vaulting. Single vaulting shafts spring from the capitals of the lower arcade and rise to the top of the triforium where the stone vaulting commences. Nor does the general resemblance end here; the very details are the same, and the section of the base referred to by Professor Willis is identical with the bases employed at Sens Cathedral. Take now the design of any other cathedral of the same date, either Noyon or Bourges, and observe how totally unlike are the proportions and arrangements. Although each example shows great artistic power, this composition is so distinct that the hand of a different artist is immediately observable, but looking at the two buildings referred to, viz., Sens and Canterbury Cathedral, if historical records were wholly wanting, we might without hesitation declare that the two buildings were designed by the same architect owing to the mannerism so remarkably evident in both structures. I do not use this term in depreciation of such undoubtedly beautiful architecture, but simply as proving how difficult it is for any man to divest himself of certain trammels whereby he involuntary repeats himself.

In the lecture read by Mr. Scott before this Institute, entitled "Gleanings from Westminster Abbey," he remarks upon the essentially French character in the details of Canterbury choir as distinguished from the vernacular architecture of the thirteenth century. This again may be cited as a proof of William of Sens continental manner.

It may here be remarked that it was not improbable some English architects who had opportunities of travelling abroad, and there seen buildings erected in France and Germany upon plans and principles then unknown to them, may have adopted their novel arrangements. In this manner Mr. Scott accounts for the peculiar design of the chevet forming the east end of St. Peter's Church, Westminster. He says, "There can be little doubt that King Henry III, during his sojourn in France, became enamoured of this arrangement, which in its perfected form he may have seen in course of being carried out at Amiens, Beauvais, Rheims, and elsewhere. It would naturally strike him as being well suited to the reconstruction of the eastern portion of a church already possessing an apse with a continuous aisle. Judging from internal evidence, which is all we have to go upon till the public documents and the archives of the abbey are more thoroughly searched, I should imagine that an English architect or master of the works was commissioned to visit the great cathedrals then in progress of erection in France, with a view of making his design or the general idea suggested by them. Would that, like his contemporary Vilars de Honecort, he had bequeathed to us his sketch book."

The general resemblance here referred to does not amount to any proof of identity between the building and its architect, such as I have sought to prove in the earlier churches I have mentioned, but it is a most interesting fact, as stated by Mr. Scott, that Westminster Abbey is the only introduction into England of the perfect French arrangement of chapels at the eastern extremity of the church, as a chevet, a combination of design beautiful beyond comparison; indeed, the square termini of our cathedrals are not worthy to be considered, or in any degree equivalent to the charm of those groups of radiating chapels at Amiens, Beauvais, Le Mans, Cologne, Prague, and elsewhere, and it seems rather remarkable that when other buildings were really copied almost literally by their architects and transplanted into England, so beautiful an arrangement as the chevet, of which Westminster Abbey affords a noble example, should not have taken root in this island.

In the minute particulars arising out of the comparison of the east end of Westminster with the contemporaneous churches of France, Mr. Scott mentions remarkable points of difference and an absence of any such marks as might be sufficient to refer this masterpiece of design and construction to any known architect, neither could he detect a French character in the details, although the composition is so essentially and singularly foreign. In this respect Westminster Abbey stands almost alone. It is indeed a building of marvellous beauty internally; its lofty arcade, richly diapered sprandrils, deeply moulded triforium, with its double order of traceried arches surmounted by lofty clerestory windows, form a composition hardly to be surpassed. Nor is there any cathedral bearing close resemblance to it. Yet strange to say, the nave of this building has been often compared with the nave of Rheims Cathedral, to which it bears very little similarity, Westminster being infinitely superior, excepting always the west front of Rheims, which is a composition of matchless beauty and a perfect marvel of sculpture. The only reason one can assign for its being put in comparison with Rheims is, that like Westminster it has been the church generally chosen for coronations.

Professor Willis adduces other remarkable repetitions of Ernulf's work at Canterbury and Rochester, both in the walls, arcades, and singular diapering. And in William of Sens' work, the base mouldings of the columns employed by him at Sens cathedral and Canterbury are identical; we might even assert that the masons used the same face mouldings.

Take again another example between the work of Bishop Leffrid II., who is known to have completed the cathedral of Chichester in 1199, where the round and square abaci occur in juxtaposition, and the details of the conventual church of Boxgrove, close by Watlington. Nobody examining the details of these buildings can doubt that they were the work of the same hand: the practised eye at once detects the characteristic marks; and, although the archives of the conventual church afford no information concerning the builder, we can unhesitatingly affirm that Bishop Leffrid must have been engaged both on the capitular and conventual edifices. Mr. Petit, in his paper upon Boxgrove church, read before the meeting of the Archæological Institute in 1859, bears testimony to the same effect. He says:—"I think any antiquary would be disposed to assign this church to the first quarter of the thirteenth century; and a comparison of it with the presbytery of Chichester, of which the date is accurately ascertained, would confirm him in the suggestion. For the pew arches, with their circumscribing arch, and the clerestory of Boxgrove, are so like the triforium and clerestory in the cathedral, that one might imagine them to be designed by the same person; at all events, copied within a short time; and there is a great similarity also in the mouldings."

Another illustration of this kind is afforded by an examination of the architecture of the beautiful church of St. Cross, near Winchester. The hospital was founded in 1136, by Henry de Blois, Bishop of Winchester, to whom also is attributed the design of the abbey church of Romsey. Like that church, it seems to have been built from one uniform plan; but, being erected during a transitional period, exhibits all the variety of detail incidental to the architectural movements then in progress. An examination of the east end of the choir of St. Cross shows in many parts such a striking resemblance to portions of Romsey, that we have here unmistakable proofs of the same hand; not only are the details almost fac-similes, but a singularity of composition pervades both buildings in the greater decoration of the north sides of each building. At Romsey, the arcade which adorns the clerestory on the north side is altogether wanting towards the south; and at St. Cross, the windows which on the south side are quite plain both in the aisle and clerestory, are on the north side richly ornamented. Whatever may be the reason for this singularity of design the coincidence is noteworthy. There is another large and interesting church in the diocese of Winchester, less known than Romsey, St. Cross, Christchurch, but possessing much architectural beauty. I refer to the Church of All Saints, at Crondall, near Farnham. When called upon some years since to report upon the condition of the chancel of this church, I was much struck with the resemblance of many of its details to those of St. Cross. I could even trace the same face-moulds in the abaci and aisle mouldings. Upon investigating the history of the building, I learned that the church was founded by the same Henry of Blois, Bishop of Winchester—the munificent founder of St. Cross and builder of Farnham Castle; and hence was at once explained that identity of character which had arrested my notice without any previous knowledge of authorship.

In the preceding remarks upon the buildings of St. Etienne, at Caen, and the Norman structure of Canterbury cathedral, Flambard's Christchurch, and Durham, Sens cathedral, and Canterbury cathedral choir, the marks of resemblance have been confined to parts of each building only, and some of the details; but it is believed that if the proportions of each structure were compared, a rule of composition would be deducible, peculiar to the designer of each building. Professor Willis has, indeed, noticed this in commenting upon Lanfranc's work at Canterbury; but descending two centuries later, we come to the grand buildings erected by William of Wykeham. The works of this great architect are well worthy the attentive study of every true lover of ancient art. His fame and works are too well known to need any lengthened account here, and it would be beside my object to enter upon such task; but his buildings afford another illustration of my theory. Those present who are acquainted with the details of his architecture at Winchester Cathedral, and the Colleges of Winchester and New College, Oxford, cannot fail to discover the unerring marks of this great master in these buildings. Remarkable as are the proportions and details of his superstructures, there is yet a charm in the proportions of his buildings which has been justly attributed to some rules in the distribution of the parts of his plans, which are identical in his Chapels at Winchester and Oxford, and not discoverable in the other collegiate chapels. In a most interesting and learned paper upon the works of William of Wykeham, read by our late respected President, Professor Cockerell, before the members of the Archæological Institute, at their Winchester meeting, under the presidency of the Marquis of Northampton, in 1845, the Professor dwells much upon various ichnographic geometrical proportions which governed the plans of many structures; and, in reference to Wykeham's buildings, he proves most satisfactorily that the pleasure which is derived from the contemplation of the chapels at New College and Winchester is entirely due to harmony of proportion reduced to a geometrical scale; and by comparing these chapels with others at Oxford, the contrast is at once observable. Here, again, we have unquestionable marks establishing the individuality of the architect, though rather in the matter of general composition than details. By instituting a parallel between the known works of eminent mediæval architects, there can be little doubt that rules of proportion would be eliminated. The investigation of this subject, however, would require much care; hasty conclusions must not be drawn; the mere circumstance that one or two mouldings agree in their proportions does not establish a general rule. The use of identical details and separate features of design may afford strong presumptive evidence of authorities, and be convincing; but the mere general similarity of proportion is not so sure a test for discovering the name of the builder as the first mentioned peculiarity. Many able men have laboured hard to prove and establish a system or theory upon which they believe all ecclesiastical buildings to have been designed. Amongst the most recent is Professor Henzleman. The wonderful industry which this gentleman shewed in collecting examples, and entering into the most minute calculations, almost exceeds belief. This subject, as some of my audience will recollect, was brought under the notice of the Institute by Professor Henzleman, in December, 1852; and so much importance was attached to his assertions, that a committee was appointed by the council to confer with the author, and investigate the whole subject. This interesting task was delegated to the late Sir Charles Barry, Mr. Scott, and myself. We had several meetings with Mr. Henzleman, and heard attentively all he advanced in support of his theory, but his conclusions were not such as to produce conviction. He appeared to have constructed numerous scales, and, by applying one or other of them to a building, showed that certain parts of the structure consisted either in plan or elevation of some fractional part of the scale. It would be difficult to meet with any building, either ancient or modern, which would not be conformable to this mode of mensuration. It establishes no principle whatever, and determines nothing.

Now, in the cases which I have hitherto mentioned the resemblances are not confined to small portions of each building, but extend to the general plan and design of the structure. Let me now, however, allude to the leading feature in an abbey church, which is so marvellously like the tower of another cathedral church that though in other respects the design bears no similarity, it is scarcely possible to doubt but that the same builder must have been concerned in both structures. It may be that the architect, satisfied and pleased with his erection in the south-west of England, was content to repeat his work in a midland county. I refer to what remains of the once magnificent Abbey Church of Pershore, near Worcester. Probably those who merely know the building by its general outline and character will be surprised to hear that the tower (or rather the two stages of it) which remain above the roof, are so like the two corresponding stages of the base of Salisbury Cathedral spire as to be almost identical in design. The composition may be thus described:—The first story rising out of the junction of the nave, transepts and choir, has double couplet windows set upon the acutely pointed weather mouldings of the roofs, the heads of these windows only are pierced, each angle of the tower has bold but peculiar turrets, and this peculiarity exists also at Salisbury; the north-east turret containing the stairs, being larger than the other three, and perforated with numerous slit lights. This stage terminates with a bold projecting stringcourse and ornamentally embattled parapet, the stringcourse profusely ornamented with the ball flowers. Above this rises the second or belfry stage, upon a set off all round. This stage is highly ornamented on each side, and may be represented as consisting of four richly carved compartments with traceried and gabled canopies, each separated by small buttresses and pinnacles. The two centre compartments form window openings, the others are blank, but have mullions and tracery heads like the rest. This stage has also a stringcourse with ball flowers; at present the tower terminates here abruptly with a parapet. There can be no doubt that it was intended to be loftier, though from some unforeseen cause it ends it its present truncated shape. Now, according to the rules of probability we should have looked for the characteristic resemblance of this tower with that of the cathedral church of Worcester, but it is utterly unlike. There is, however, in the style and architectural features of the choir, ladye chapel and small transepts of Worcester Cathedral a close correspondence with the like portions of Salisbury Cathedral, and it is very singular that the tower of Pershore should be so uncommonly like the lower part of the central tower of Salisbury Cathedral also. Upon examining the accounts which are handed down to us relating to Pershore, there is a list of the abbots who presided over the abbey from the Conquest to the period of the dissolution of the establishment at the Reformation, and some incidental notices are given of the building of the Abbey Church. No mention is made respecting the erection of the beautiful choir, central tower and ladye chapel, but reference is made to the devastation which the building suffered by fire at different times. In Nash's "History of Worcester," and in the valuable collection of the

Pratlington Manuscripts in the Library of the Society of Antiquaries, which I have carefully searched, I can discover no clue to the architect of the remains of this beautiful structure. Remembering, however, the proximity of Pershore to the famous Abbey of Evesham, and the fact that more than one of the monks of the former was Abbot of Evesham, I sought for the list of the abbots of this once stately monastery, and found a goodly description of them in Nash's "History of Evesham," and curiously enough discovered the following entry:—"William de Wytechurch or Marlborough, Monk of Pershore, and afterwards Abbot of Evesham, 1282," and it is added that in his time and that of his successor extensive progress was made in the building of the Abbey Church, &c. Now this William de Wytechurch, in Wiltshire, if not connected with the church at Sarum, must have been familiar with the architectural works then being carried forward within twenty miles of his birth-place, the fame of which was famous throughout England. It is known that the cathedral at New Sarum was began in the middle of the thirteenth century, and took more than forty years in building. Now nothing can be more probable than that William de Wytechurch, struck with the beauty of the works at the cathedral church of Sarum, either brought with him from Wiltshire the master mason or became himself the architect of the tower of Pershore, adopting the design of the tower of Salisbury. Whether the tower and spire at Pershore were ever completed there is no evidence to show, and though it is recorded that the former tower built in the Norman style fell, there is no tradition of a similar disaster happening to the building of the thirteenth century. I however strongly incline to the belief that the tower and spire were finished, and that some calamity afterwards happened, leaving the lower part in its present unfinished condition. We can judge how imperfect must have been the construction, which imposed the necessity of building the huge raking buttress at the north-east angle, which, though boldly designed, greatly injures the external effect of the church. Any one comparing the towers of Worcester Cathedral and Pershore must at once see how much more masterly are the details of the latter, and it is further no rash supposition to infer that the architect of Pershore may have had some connection with those other portions of the Church of Worcester, which also bear so much similarity to Salisbury.

Applying the test which has been dwelt upon in the preceding remarks to one of the most beautiful towers in Somerset (I mean St. Mary's tower, Taunton), a popular notion respecting that structure will be refuted; or rather I should say the former structure, though I must here state that the new tower, built under the superintendence of Mr. Scott and myself, is a careful facsimile in every respect of the ancient design. This tower was said by many to have been designed by Sir Reginald Bray, whose undoubted works at St. George's Chapel, Windsor, and Great Malvern, are well known. This conclusion rests only for its foundation upon the circumstance that the initials R. B. were carved upon some shields ornamenting the transoms of the belfry windows, and which letters have been claimed as the initials of the great architect. Now Sir Reginald succeeded Bishop Beauchamp as surveyor of the works at St. George's Chapel; and it will be observed how profusely his arms and devices are scattered over the nave and transepts of that chapel; whereas, the letters R. B. are the only marks sculptured upon the shields on the tower, forming too slender grounds for identifying the building with Sir Reginald Bray; and I am satisfied that no intelligent antiquary or architect on comparing St. George's Chapel and Bray's other works with the tower of St. Mary's, would believe that the latter could have been designed by him (although built probably about the same time). There is no similarity either in composition or detail, or a single point of coincidence between the buildings. St. George's Chapel has its arcades, stone vaulting, and windows constructed throughout with depressed four-centred arches. The greater part also of Malvern Abbey Church is constructed in a similar manner; and the details have not the spirit which was so beautifully carried out at St. Mary's, Taunton, where all the fenestral features and panelling were elegantly designed, with arches of two centres only; neither do the sunk mouldings of the window jambs show any such resemblance in section as we might expect to find in works of the same artist; it is also most unlikely that so distinguished a man as Bray would have omitted to place either his arms or devices in some prominent position, whilst we see that elsewhere he used them so freely as ornaments to his buildings. I think, therefore, this tower may with much more truth be assigned to Richard Beare, an abbot of the great Abbey of Glastonbury in the the same diocese. The same letters R. B., accompanied with the mitre (he being a mitred Abbot), are to be found on St. Benedict's Church, Glastonbury, and also on some Alms-houses situated in the outskirts of the town of Taunton. I am far from supposing that any great architect would tamely repeat the identical mouldings generally; yet there can be no doubt that some men have preference for peculiar forms, proportions, and details, which are therefore always observable in their works, and often form criterea by which, in the absence of other proofs, their buildings may be recognized. Everybody knows that in the sister art of Painting, the works of distinguished painters are clearly discovered by the peculiarities of colour, style, and treatment; and a connoisseur will tell you with certainty the name of the artist whose works are placed before him without the aid of initials or autograph. So also in sculpture, though perhaps with somewhat less certainty; yet there are marks by which the sculptor's work may be identified, notwithstanding the want of historical evidence. It would, I think, be very interesting to institute a careful comparison between the magnificent monumental remains throughout the cathedrals and churches of this country. The name of the artist who designed the splendid canopied tombs of Crouchback and Aymer de Valence is unknown; but in all probability it was the same artist who designed the monuments of Gervase Alard, Admiral of the Cinque Ports, erected in Winchelsea church. The composition and details are so like in style as to justify this belief. There are other monuments, such as Archbishop Peckham, in Canterbury cathedral, of a less ambitious character, which would seem to proceed from the same hand. Coming to a later period, I may cite the well known monuments also of the Cobham family, in Lingfield church. When examining these tombs with the members of the Surrey Archæological Institute, last August, I was much struck with the remarkable resemblance in the ornamental details of the armour of the knight, and the vestments of his lady, with the habiliments of the effigies of Sir John and Lady Chideock, in the priory church of Christchurch, Hants. Upon referring to an historical account of the Lords of Stourborough Castle, in the last volume of the Surrey Archæological Society, I there learnt that the beautiful tomb with the recumbent figures referred to, represented the second Sir Reginald Cobham and his wife, founders of Lingfield College. This Sir Reginald Cobham and Sir John Chideocke, of Chideocke, in Dorsetshire, his wife's brother, were knighted by Henry VI., in the fourth year of his reign. What is more probable, therefore, than that the same sculptor should be employed by the descendants of these related persons in the design and erection of their joint family tombs? It is only to be regretted that the name of the sculptor who could produce such beautiful figures is unknown. There are, again, numerous magnificent chantries and tombs in our cathedral and abbey churches, erected about the time of Henry VIII., when the admixture of classical details with Mediæval forms produced the Renaissance style, which may be attributed to the workmanship of one man.

It is well known that at this period eminent Italian artists were brought into England at the instance of Henry VII. and his distinguished nobles. A few years since, interesting documents were found recording minutely the contracts entered into with Pietro Torrigiano, the painter and sculptor of Florence (who came over in 1512), for the erection of the tomb to Henry VII., and also for a contemplated tomb for Henry VIII. and Queen Katharine. The identical arabesque ornamentation of the friezes and pilasters of Henry VII.'s tomb are repeated upon parts of the beautiful chantry chapel of Margaret, Countess of Salisbury, in Christchurch Priory Church; and his work, I think, can be traced in many other monumental shrines of distinguished personages in our cathedrals and large churches. Sufficient has been advanced to show what an interesting field of research in the direction I have indicated lays open to those whose professional tours in the country give them the opportunities of comparing buildings and monuments with each other, and I think it is peculiarly the province of the professional architect to pursue this course. No opinion of the mere antiquarian, if unaccompanied by some knowledge of construction, can be conclusive.

The **President, Professor Donaldson**, having invited some observations on the paper—

Mr. **Beresford-Hope**, Hon. Fellow, said although he had not made a minute study of the buildings of the class on which Mr. Ferrey had discoursed, which as an amateur he delighted to do, he could testify to the pleasure they must all feel at the collection of examples which that gentleman had brought before them to illustrate the gradual working out of those difficulties, which with increasing knowledge they must more and more recognize as existing in the history of Mediæval architecture. In those ages there was neither the rapid transmission of ideas nor of materials which existed in the present day. The history of the professional education of the men who practised, the way in which working drawings seemed to have passed from hand to hand as a kind of cherished property, were among the incidents of architectural progress which he feared they would never be able to fathom.

Mr. **Wyatt Papworth**, Fellow, said it perhaps would be remembered he had submitted two papers to the Institute of a similar character to that they had just heard; and being greatly interested in the subject, he rose with great pleasure to move that the best thanks of the meeting be given to Mr. Ferrey for his valuable paper; he would append to that motion—that he be requested to add to the title, after "Mediæval architects," the words "and builders." He proposed this for the reason that he entirely disagreed with the idea that the persons mentioned could be considered as *architects;* having given some study to the question, from the information he had obtained he could not do otherwise than doubt whether such personages possessed any *architectural* knowledge. With respect to the first mentioned—Gundulf—of whose life such elaborate details had just been given, his friend Mr. Ashpitel and himself had gone carefully through all the documentary evidence on the subject, and both were of opinion that he was no *architect*, as the word was now understood. Mr. Papworth considered that all these archbishops and bishops had master masons, to whom he firmly believed the whole credit of the design and erection of the buildings was due. He thought that when the clergy in early times were promoted from priory to abbey, from abbey to cathedral, and from see to see, that they often took their master mason with them, which would account for the copyism, or at least the great similarity found in certain buildings described by Mr. Ferrey. He had obtained during the last eight or ten years a large mass of materials of a similar nature to that with which the meeting had been favored. The strongest evidences existed that many parts of buildings had been copied one from another; and in his own collection were notices that parts of one structure were proposed to be copied from another. The type exhibited at the mother church was to be seen in the various churches built in the same era around it. Near Ely there are some churches which are acknowledged as having been built by masons employed at the monastic establishment. He believed that in early times the best artificers were principally to be found at the monastic establishments; afterwards they set up for themselves as masons, builders, and so on, in the larger towns. Of all the persons mentioned the only one to whom he could apply the term *architect* was William of Sens. Mr. Ferrey had not given any outline of his life, but documentary evidence existed to show that he was a working mason; and in the well known competition of artificers for carrying out the great work at Canterbury, William of Sens was the one selected as the best master mason: and had not Gervase's account come down to us, the rebuilding would always have been known as the work of "Archbishop Richard, *the architect*." Mr. Ferrey considered that the clergy living in monasteries had "undisturbed lives," and were therefore able to give that attention to the study of architecture, for which the laity had neither the time, nor the means, nor the education. He himself thought it could hardly be possible to find a more busy man than Gundulf, excepting perhaps Flambard, and the words quoted could hardly apply to them. The former was always most actively engaged, as appeared from the historical records that had been handed down to us by a monk who lived a few years after his death; it was hardly to be supposed, therefore, that Gundulf had given personal supervision to the numerous works to which his name was associated; that he was a great *builder* no one could doubt, and the same might very properly be said of Flambard, of William of Wykeham, and of others. They each appeared to have abundant means at command, and they spent them in erecting the fine buildings of which we were so proud, and to which their names had been applied. He thought he had proved that William of Wykeham had his master mason, and it was known that William de Wynford in his early days was the king's mason, and possibly worked for that bishop at Windsor; it was well known that he was employed by him at his college at Winchester, as Wynford's portrait existed there; and also on the works at the cathedral of the same city: he might also have been so at Wykeham's structure of New College, Oxford. Mr. Ferrey had mentioned the cloisters at Norwich Cathedral as having been a long time in hand, yet carried out according to one design; the name of the master mason who commenced that structure was known, and his design was continued through a period of nearly three centuries. In conclusion he (Mr. Papworth) desired to express the great pleasure with which he had listened to the paper, and to bear his testimony to the great acccuracy of the descriptions given of those buildings with which he was acquainted. He would only add, that unless the knowledge of architecture and building possessed by the bishops and ecclesiastics of olden times had been greater than it was at the present day, it certainly would not have attained to any very great eminence.

Mr. **Morris**, Associate, remarked with regard to the circular building pointed out by Mr. Ferrey as charged externally with net-work, shells, and twisted ornaments that had probably some symbolical signification, it seemed to him (Mr. Morris) that they bore what might be termed an aquatic character. This might, he thought, have some relation to the metaphor used by our Saviour in his summons to Peter and Andrew, who from mere catchers of fish were promoted to be apostles and "fishers of men." (Matthew, c. iv, v. 19.) It was also to be recollected that in early Christian ages, previous to the introduction of fonts into churches and the celebration of baptism by priests, that that rite had been exclusively performed by the bishops. There was at Ripon Cathedral a building, older perhaps than the main fabric, and reputed to have been a baptistery; such buildings were generally circular. Upon the support such an impression seemed to derive from these particulars he desired to ask Mr. Ferrey whether the building at Christchurch, to which he had drawn attention, was built for a similar purpose.

Mr. **Ferrey** said that this circular building stood at the north-east corner of the transept, over the crypt. It was therefore not easy to imagine that it could have been designated as a baptistery in any sense. The date of it was known; it would be the latter end of the eleventh century.

Mr. **Beresford-Hope**, having seconded the vote of thanks to Mr. Ferrey.

The President said it had been remarked by that gentleman how interesting it was to seek out and ascertain the names of the architects of our cathedral churches. He felt how true was that observation, because it opened up other sources of enquiry of the highest interest, such as the *schools* from which were derived all the variety of sentiments and feelings which prevailed in the Mediæval monuments of this country. On going into our cathedrals it was evident that different types and characters and thought were prevalent in those edifices, distinguishing the one from the other. Similar types were found to prevail throughout the European continent. In Germany and France was discoverable the repetition of the same sentiments as in our own cathedrals. It would appear that Durham and Christchurch had been designed by the same architect; and there was to be traced in examples abroad two distinct developments of the Byzantine; for there were the German Byzantine, the French Byzantine, the Lombard Byzantine, as well as the English Byzantine. Durham reflected the Lombard Byzantine more than any other; as, for instance, in the square piers with the vaulting shafts, which formed the great divisions of the nave, and the heavy columns between those piers dividing the bay into two openings. They found the same style prevalent in the Church of St. Peter, at Northampton, with the same piers and vaulting shafts, and the intermediate columns, resembling the Byzantine of the Lombard type which was found in many of the churches of Lombardy, as, for instance, at St. Zeno, Verona. Another type was that of the French Byzantine, as in Caen, where the arches were in a continuous line of the same size. These implied two distinct principles; and Flambard must either have been himself inoculated with the feeling of the Lombard style, or else borrowed it from the architects of such buildings as Durham and Northampton. Then another type is traceable, as at Oxford and Romsey, which Mr. Ferrey believed both to have been designed by the same architect. His (the President's) own opinion was, that there was a connection between the religious establishments in this country and those abroad, so that when a fraternity in England contemplated the erection of some great or novel work, they would apply to their brethren abroad, who sent over an architect capable of doing it; or else, one from England was sent abroad to study the peculiar examples of that country. Referring to the inscription "*fecit*" on some of the works mentioned by Mr. Ferrey, it was noticeable that the classical artists never used the perfect tense, but always the imperfect, *i.e.*, "faciebat," as though the work were progressing, and not as completed; this was curious as a literary question. With regard to the late Mr. Cockerell's and Herr Henzleman's theories of the geometric law, which governed the proportions and forms of Mediæval architecture, he felt there must be some such existing; it had eluded their research hitherto; he, however, could not but think, that in building, as in other arts, there were geometrical combinations and proportions which, though undiscovered at present, might have served as a guide to the architects of those buildings. He had great pleasure in putting the resolution of the vote of thanks.

Mr. FERREY said that he hardly felt justified in at once accepting Mr. Papworth's proposition, and that he was not disposed to set aside records and documents which spoke freely and emphatically, merely because his friend thought it more desirable to insert the words "and builders," or "master masons." He saw no reason why the bishops of former days should not have been more gifted in the way of architectural knowledge than their brethren of the present day, and he had no doubt whatever the old bishops were the architects of those works which stand in their names.

The vote of thanks to Mr. Ferrey having been passed unanimously, the meeting adjourned.

SUPPLEMENTARY BALANCE SHEET TO MAY 2ND, 1864.

RECEIPTS.

1864.		£. s. d.
To Balance in the hands of the Treasurer on Dec. 31, 1863..	68 2 4	
— Ditto in hands of the Librarian ditto	1 7 7	
		69 9 11
— Subscriptions and Entrance Fees of Members		739 4 0
— Composition of Two Fellows (Country)		35 14 0
— Voluntary Examination Fees..................................		4 4 0
— Sale of Transactious, Sessional Papers, &c.........................		7 5 11
— Half Year's Dividend on £3069. 4*s.* 7*d.*, £3. per Cent. Consols (less Income Tax).......................	44 13 11	
— Ditto on £190. 7*s.* 5*d.*, £3. per Cent. Reduced Annuities (less Income Tax)	2 15 6	
		47 9 5
— The Executors of the late Sir Francis E. Scott (Amount of Prize)....		10 10 0
		£913 17 3

EXPENDITURE.

1864.		£. s. d.
By Rent, Taxes, Salaries, and other current Expenses, from December 31st, 1863		486 6 9
— Purchase of Stock..		35 14 0
VOLUNTARY ARCHITECTURAL EXAMINATION—		
Honorarium to Moderators	21 0 0	
By Fees returned..	8 8 0	
Various Expenses	11 4 2	
		40 12 2
Balance in the hands of the Treasurer	343 11 5	
„ „ Librarian	7 12 11	
		351 4 4
		£913 17 3

ASSETS.

	£. s. d.
Cash in the hands of the Treasurer and of the Librarian	351 4 4
Amount due from Members..	316 1 0

LIABILITIES.

Rent, Taxes, Salaries, Trade Accounts not yet settled, and other current Expenses.

PROPERTY.

The value of Copies of "Transactions" and other Publications in Stock, Books, Drawings, Prints, Models, Casts, Furniture, &c.

THE FUNDED STOCK of the Institute consists of:—

£3108 0 7—£3. per cent. Consols.

190 7 5—£3. per cent. Reduced Annuities.

Sixty-six Shares in the Architectural Union Company, (Limited), at £10. per Share = £660

£840 Perpetual 5 per Cent. Preference Stock in the London and North Western Railway Company (Pugin Memorial Trust Fund).

JOHN P. SEDDON, } *Honorary*
CHAS. FORSTER HAYWARD, } *Secretaries.*

ON SOME EXAMPLES OF MURAL PAINTING.

By the Rev. Edward L. Cutts.

Read at the Ordinary General Meeting of the Royal Institute of British Architects, May 16th, 1864.

Traces of decorative painting frequently come to light when the whitewash is stripped off the walls of a church in the progress of restoration or repair; but usually they are only fragments; and it is rarely that we are able to discover the whole system of decoration throughout a church. When such a discovery occurs it is worth putting on record; and even when the design and arrangement merely of the decoration of any considerable portion of a church comes to light, it is desirable that it should be recorded.

My purpose is to lay before you two or three such discoveries which have come under my own observation, and which, I believe, are hitherto unpublished.

The first of these is the entire decoration of a little Early English church in a very simple style, both of architecture and of coloured decorations, viz., the desecrated church at Little Coggeshall, in Essex. This church is otherwise interesting to architects from the fact that its dressings are of moulded brick of the thirteenth century, the mass of the walls being of flint and rubble. I exhibit a photograph, which will show these peculiarities of its construction. The plan of the church is a simple parallelogram, without any constructive division between the nave and chancel. The elevations are as follow: the *east end*, three long lancets grouped under a containing arch, with a light (probably circular) over them in the point of the gable; *west end*, a similar triplet without any light over it; *north side*, four lancets; *south side*, three lancets and door, the two westernmost lancets shortened to leave room beneath for a group of three sedilia, a double piscina, and a trefoil-headed credence. There is a semicircular string course running under the windows; the angles of the window-splays have a bold roll; the wall-plate has two rolls with a hollow between.

The colouring of the interior is as follows. Below the string course the original plaster of the wall is left untouched; above the string it is painted in masonry pattern in double lines, one line dark and the other pale. This pattern runs round the angle moulding of the window-splays, and extends two or three inches on the face of the splays, and then is stopped by a double vertical line, and the rest of the splay has the masonry pattern continued in single lines only. The string is of an emerald green, glazed. The wall-plate has its two rolls also emerald green, with the hollow between them white. The spandrils of the east window are ornamented with a flowing foliage pattern of usual Early English character. At the back of the niche of the middle sedile are traces of a cruciform nimbus, which is enough to prove that it contained a representation of our Lord. Perhaps the two other sedilia had also figures. Fragments of a pavement have been found, sufficient to enable us to restore the whole design, which was a geometrical pattern of buff, green, and dark red, of which I exhibit a drawing.* It is perhaps of later date than the wall decoration. Part of the original roof remains over the east end, and the nave roof is probably made up of the original timbers, but no trace of painting can be detected upon them. If the roof was not originally touched with colour, we have before us the entire plan for the coloured decoration of this little church.

At Little Braxted church, in Essex, a recent restoration brought to light some indications of the coloured decoration of different periods. It is a little Norman church, with a rounded apse, with five small round-headed lights in the apse, and one in each side of the chancel. The original decoration was of masonry pattern in double lines, which appears to have been confined to the chancel. There are also two dedication crosses remaining, painted on the east wall, under the two windows on each side of the central light. A cross patée within a circular rim, the cross dark chocolate, the rim of a dirty grey colour, which is probably faded blue or green. I have met with other examples of dedication crosses of different dates, and they are all of about the same shape, and seem to have usually the same colours, red and green, introduced, *e.g.* at Wiston, Suffolk, and at Great Coggeshall, Essex.

---

* This, together with a further description of the church is published in the Essex Archæological Transactions vol, iii., part 2, 1864.

This original colouring was washed over probably at the time that the present decorated east window took the place of the original round-headed light, and the walls of the chancel were diapered over with a flower in very dark red, of which I exhibit a drawing. This also seems to have been limited to the chancel walls. This again had been washed over in the sixteenth century, and texts painted in black letter, with red ornamental borders of Elizabethan or Jacobean character.

The next example is the large fine perpendicular church of Great Coggeshall, in Essex. During the restoration of this church, I looked carefully for all indications of its original coloured decoration, and think that its entire plan could be made out. The plan of the church is chancel and nave, and aisles running through from east to west, with tower and porch. Colour seems to have been very sparingly applied to the architecture. The walls generally seem to have been left unpainted, with only a line of red in the moulding round the edge of the window splays. The bell of the capitals of the pillars was red. The arches across the chancel and its aisles had a few stripes of plain colour in the mouldings—chocolate, bright red, and yellow. The east walls of the chancel aisles had been painted over with a tapestry pattern, common in the time of Henry VII., which pattern returned a short distance along the adjoining walls to form an enrichment about the chantry altars. There was, moreover, a whole series of dedication crosses upon the walls of the chancel aisles, like those already mentioned; the cross dark red, and the rim of dirty grey (probably faded green). There were two under the windows of the north wall of the north chancel aisle, and one beside the east window of that aisle, one under the east window of the south chancel aisle, and four others under windows in its south wall; and in the absence of other painting this series of crosses must have been conspicuous. It will be seen that there was very little painting indeed, and for that very reason I think it is worth noting, as a proof that in a fine large handsome church the system of decorative colour was sometimes of a very simple character. I presume the painted glass in the numerous and large windows afforded abundance of colour of the most brilliant kind, and it was desirable that the wall spaces between should be left plain, as a foil to the glass paintings, with only a line of colour here and there to give emphasis to the chief architectural features, and to carry the colour into the body of the building.

I should mention that there are traces of colour on the external mouldings of the south doorway and chancel doorway of this church, which indicate that the entrances to the church were then enriched. I have met with other evidences that colouring was applied to interior decoration.

These are examples of mere decorative painting of the simplest possible kind. I have now to submit to you some more elaborate examples. It is common enough to find remains of paintings of scriptural and legendary subjects on church walls, but most commonly they are isolated subjects, which give no clue to any general series or plan of arrangement; indeed, in many cases, unconnected pictures seem to have been painted on the walls, here and there, at the caprice of the painter, without any general plan or arrangement at all. I submit the following examples, because they do indicate a plan for the symmetrical arrangement of a series of pictures for the decoration of a church interior.

In the churchyard of St. Brelade, Jersey, there is a chapel of no architectural character but interesting as an example of the detached chapels which used sometimes to exist in our churchyards, and interesting for some remains of painting in the interior. The interior is a perfect plain unadorned parallelogram, roofed in with a perfectly plain pointed vault. On this vault are the traces of painting. Along the top is a line of foliage pattern. Each side of the vault is divided into three long lines of painting, the subjects following one another consecutively, as in the Bayeux tapestry. They are painted on the ground of white plaster, which is diapered with a pattern. On the north side, beginning at the west end, the subjects are Herod sitting in judgment on our Lord; on a scroll out of his mouth herodes roy. His soldiers and men-at-arms indicate the date of the painting to be early in the fourteenth century. The next subject is the Binding of our Lord. The second row begins with the Scourging of our Lord; next, Bearing the Cross. The lower line of painting is now obliterated. On the south side, beginning at the west end, the subjects are as follows:—in the first portion is seen a kingly figure, but the rest of the subject is obliterated; the second picture is clearly an Annunciation. So it would seem as if the history of our Lord's Nativity formed the subject of the series on the south side, and his Passion the subject on the north. At the west end of the building is the subject of St. Michael weighing Souls. The painting is in red outlines, and of good execution.

This, then, suggests one mode of arranging a series of mural paintings in a church, especially when the paintings are consecutive scenes in the same history, viz., to put them in two or more lines along the upper or middle part of the wall, with borders between the lines; the wall-space above the paintings, if any is left, being diapered with some simple pattern, and finished with another border under the wall-plate.

In the restoration of Headington Church, Oxfordshire, no less than twenty-four coats of whitewash were counted on the wall, and if these could have been peeled off entire, they would have given us no less than six different series of wall paintings of different dates. The latest were of Tudor date, and nearly the whole scheme of decoration could be made out. There were bright red and white lines up the pillars; the nave arches had red chamfers; and an engrailed border, each point of the engrailing ending in rudely drawn trefoils, ran round the labels of the nave arches and round the margins of the window and door arches; all splays were crossed with diagonal stripes, with semi-circles and trefoils budding out at about every foot. There were some traces of red tapestry pattern on the south wall to the left of the door, and on other walls texts in black letter, with broad borders of red or of red stems with green leaves. On four other coats of whitewash were powderings of crosses, roses and knots. The original painting of thirteenth century date was the most elaborate and interesting, and again a great part of the entire scheme of colour could be made out. The nave arches were coloured red on the exterior chamfers and yellow on the interior, with a scroll pattern, like that on south wall, on the soffit; the angles of window splays and doors had a running pattern of yellow divided by pink mortar lines, with a centre line of white on the pink. The east end of the nave was entirely covered with painting: below was a pattern of hangings, like that on the north wall; above that the wall was powdered with red cinquefoils on the buff plaster, and divided by stripes of red. Immediately over the round Norman chancel arch was a painted arch of scroll pattern, upon the upper part of which was a picture of the Majesty, viz. a figure of our Lord under a canopy, with kneeling figures on each side. Part of the south wall is represented in the accompanying drawing. The lower part of the wall beneath the windows is covered with a pattern of hangings; the lower part of these hangings is destroyed, and the fringe which is added in the drawing is only conjectural, and is very possibly incorrect. The special feature for which I exhibit the drawing is the *arrangement* of the pictures. A masonry pattern is carried round the angle of the window splays, and the pictures are painted on the broad splays themselves; other pictures are added in the wall spaces with an irregular arrangement, *i. e.* they are not symmetrical with respect to the principal series, or to the wall spaces on which they are painted. The subjects of the paintings cannot all be made out satisfactorily; some of them seem to be incidents in the life of our Lord, but others, intermixed with these, appear to relate to other subjects; *e. g.* on the left jamb of the first window the subjects seem to be the Nativity and the Flight into Egypt, but those on the right jamb do not seem to belong to the same history, and are not intelligible; again, the two upper pictures on the right window seem to be the Slaughter of the Innocents and the Triumphal Entry into Jerusalem, but the lower pictures again do not seem to relate to the same story, and are unintelligible. The heads in the upper part of the splays are Saint Peter and Saint Paul in one window, and a Queen and a Bishop—probably two Saints—in the other.

The last example I have to submit to you is from Wiston Church, Suffolk. The Church is of Norman date; it has a chancel with apse, nave without aisles, three windows and a door on each side. In restoring the nave some years ago, remains of painting were found upon all the walls, and careful tracings were made, though the subjects were very imperfect; and I shall endeavour to describe their arrangement. On the north side there were two rows of paintings, one beneath the level of the window sills, another between the windows, a little space intervening between the two rows; scroll borders bounded both top and bottom of both rows of paintings. The border at the bottom of the upper row extends into the splay of the window, and the corner of splay cut off is powdered with blue cinquefoils; perhaps the series of paintings extended into the splay; the raising of the line of painting, so as to run continuously into the splay, seems an improvement on the method adopted at Headington. There was also a painting on the tympanum of the north door. Some of the lower line of these paintings are perhaps incidents in the history of John the Baptist: the first is undecipherable; the second is Herod amid his Lords, High Captains and Chief Estates of Galilee; the third is a sitting figure before a group, of whom the first wears an iron cap; the execution of John in prison is the last but one; and a fragment of John's head, with a head of an elderly female, probably Herodias receiving the Baptist's head, comes last. Only one of the upper row (that at the east end) is decipherable: a Franciscan friar enters into the subject. The picture in the tympanum is also traced, subject unknown. On the south wall is the more perfect and interesting series. Between the windows is painted an arcade of trefoiled arches, with a picture under each arch. Another row of pictures in square panels comes under the arcade, bordered by scrolls. The subjects of the upper series seem to be as follows, beginning at the east end :—

1. Annunciation.
(Window.)
2. Nativity.
3. } Annunciation. { Angel and Star.
4. } { Shepherds.
5. Adoration of the Magi.
6. Undecipherable.
(Window.)
7. Undecipherable.
8. The B.V.M. } Over south door.
9. The Magi warned. }
10. Female Figure with child.

Two or three others undecipherable.

The paintings of the lower row are much mutilated. There are lines of red in the mouldings of the chancel arch, and a scroll pattern. On the east wall, on the right-hand side of the chancel arch, is a painting of a saint holding a cross, in the same line as the arcade described above; but the wall above this picture is diapered with the pattern exhibited. On the west wall are two rows of paintings with borders, the two rows probably forming part of one subject, which is the Last Judgment; the judge in the middle, with groups on each side in the upper row, and in the lower row angels receiving the blessed, and fiends hurrying away the lost. The figures are executed for the most part in strong red outlines on the original ground of buff-coloured plaster, with occasionally a part of a dress or a piece of drapery entirely washed in with flat colour, only red and blue being introduced. The style of art is like and equal to that of good illuminated manuscripts of the period, which I take to be the former half of the fourteenth century.

By collecting together the fragments which are found scattered in various churches, no doubt we could make out many other entire schemes of Mediæval coloured decoration of various degrees of simplicity or elaboration. Perhaps every gentleman present has some examples in his note book, not of much use alone, but which might be made useful if brought into comparison with others similarly useless in themselves. May I be allowed to take the opportunity which you have given me in inviting me here to-night to say that if any gentlemen possessing such notes and sketches please to communicate them to me, I will promise to take pains to put them together and to endeavour to make them generally useful.

Mr. GEORGE EDMUND STREET, V. P., rose to express his grateful feelings to Mr. Cutts for his observations on this subject. He felt that the decoration of church walls was a matter of extreme importance; but the more he thought, the more he saw the difficulty of it: and having begun life with painting walls himself, he had come finally to the practice of not having any painting at all done, except by some one who could paint a great deal better than he was himself ever likely to do· He confessed he did not see his way to the restoration of the practice of painting church walls as it existed in this country in the middle ages; because, following their example, they must have figure subjects; and it must be confessed that the drawings which appeared to satisfy people 500 years ago, would not, at the present day, be put up with; and if they wanted a better class of painting the expense would be very large, though he hoped that here and there symptoms were seen that people were becoming alive to the fact that for the same money that they now pay for bad stained-glass decorations they might have something much more really good painted on their walls. At the beginning of last week he was looking at one of the most distinguished painters of the day engaged on some work he was executing in Lyndhurst church, Hants, and if he did not sympathise in every respect with the design of the work, it was undoubtedly one of great beauty and importance. This was the work of Mr. Leighton, and with such a painter he need not say that they had every assurance of the work being extremely well done. Now it was of importance that painters of eminence, like Mr. Leighton, who had not perhaps been able to give any great attention to the examples of old English mural paintings, should have some such guide book of what the old painters had done, as Mr. Cutts had expressed his intention of favouring them with. If a painter adopted a system of arcading or panelling for his subjects, the effect would generally be good; and it was not an uncommon arrangement in old examples. He had in his mind a church at East Wickham, in Kent, which once contained some very interesting paintings of the thirteenth century, arranged in two arcades, one above the other, all over the chancel walls. Almost every church in the country had been more or less painted, and a great many systems might be referred to. There was one cathedral, especially, to which he would like to call the attention of the Institute, which seemed to afford the most important example of mural painting in this country, viz., that of Salisbury. Any one who looked up to the groining of the choir there might see clear traces of the paintings, with which the vaults and walls were covered, shewing through the plaster; and he trusted it would be part of the object of Mr. Gilbert Scott, in his work there, to clean off the whitewash and preserve these interesting works of art; inasmuch, as from what could be already seen through the plaster, the work was evidently very finely painted. There are pieces of a great many figures, and the detail is of the same character apparently as the well-known paintings in the chapter-house. There was another important point raised by the consideration of such a paper: that was the way in which new wall paintings should be done. Headington church had been mentioned as having been painted six times in 300 years, which gave a duration of fifty years to each set of paintings; and now, perhaps, if paintings were done in distemper, the probability was, that after fifty years, wherever liable to injury, they would be so far injured that the next generation would be sure to paint them again. That would be disheartening to those who wanted something more than mere diapering, which was, to his mind, a poor kind of decoration for the walls of churches. This part of the subject was full of difficulty, and he had been always very much interested in the discussions which had taken place as to the best mode of getting wall paintings executed. The east wall of a church which he had himself built in Westminster had been painted in fresco by Mr. G. F. Watts, and unless he was much mistaken that was beginning to show signs of decay. Mr. Gambier Parry, an amateur to whom art was much indebted, had set to work to paint the church he had built at Highnam upon a new system of his own invention, and Mr. Leighton was following the same system at Lyndhurst, with such success that there was absolutely no difference in the work done two years ago and that which Mr. Leighton was now executing. He saturated the plaster with essential oil, and painted upon that, and kept soaking it with oil all the time he was painting. It was, therefore, entirely different from fresco; and in those parts of the building free from damp he thought it was likely to be more durable. Almost all the early paintings on walls in England and on the Continent were, he believed, in distemper. The early paintings in Italy were distemper, and not fresco, and afforded good evidence that distemper was durable when placed out of the reach of damp or damage by hand. Probably distemper painting would be much more commonly practised for the future, owing to the invention of water-glass, though some of those who were acquainted with it thought it would not answer as well as was imagined; and this, indeed seemed to be proved by the state of some of the pictures painted in that process in the church of St. Alban, Holborn. In conclusion, he had much pleasure in now proposing that the thanks of the meeting be given to Mr. Cutts for his interesting communication.

The Chairman, EWAN CHRISTIAN, V.P., said the Norman and Early English architects used a very superior kind of plaster, which remained in many instances quite perfect to the present day. He had seen several paintings on that plaster 700 or 800 years old still in good preservation. A good example of it was to be found in the lower story of the buildings attached to the Abbey of Hambye, near Coutances, now used as cider cellars. There were many instances in which original paintings had been coated over with whitewash, and fresh paintings added in succeeding generations. That was the case in Little Braxted Church, in Essex; there were in that case three successive sets of paintings, but those on the Norman parts of the building remained almost perfect, notwithstanding the coatings of whitewash that had been applied in after ages. In these days the art of plastering walls as practised in the early periods of Gothic architecture seemed to be lost. The ancient plaster was a very superior kind of stucco, whether used externally or internally; and he believed it to be the constant practice of the early builders to plaster their walls, leaving them for Nature's painting outside, whilst decorating them by the art of man internally. He had seen, within the last year, some very good specimens of wall painting in a little Church at Sharncote, near Cirencester, where the early decoration on the east side of the chancel arch was as perfect as when it was first executed on the original plaster, and had fortunately never been covered over with whitewash. As regards external plaster, some thirteen or fourteen years ago Mr. Cutts asked him whether he thought rubble walls were not always intended by their builders to be plastered externally, there being at that time a great rage throughout the country for clearing off all the ancient stucco and pointing the stonework, and he believed it had been mistakenly done. Since that question had been put to him he had been a very careful observer in the matter, and had come to the conclusion that almost every rubble wall he had examined had been originally plastered between the dressings, both inside and out. As regards interiors, he believed it was intended that all churches should be decorated by painting, and he thought it was a practice that it was desirable to revive in the present day. It might be a question whether they could go to the extent of the beautiful decoration referred to by Mr. Street, but still much might be done to render the walls of churches less bare and ugly than they were generally left. He believed as a rule all the rubble walls of the country were plastered, and a great deal of plaster had been stripped off which would have been much better left on; and, as Mr. Cutts remarked, in the photograph taken from Little Coggeshall Church there was the trace of the original plaster on the exterior. And he would remark with respect to that church, that any gentleman who happened to be in the neighbourhood would be amply repaid for a visit to it. It was the most remarkable example of early brickwork he knew in the country; the very earliest example he had met with. With regard to painted decorations, Mr. Street had suggested that they were whitewashed over because they became dusty and faded. Now, he thought, if the fine plaster spoken of were used as a preparation for the painting, it would bear sweeping without injury to the painting, and believed the painting would last as long as the wall.

Mr. STREET thought nothing looked better, usually, than a rough stone wall. He had looked into this subject as carefully as any one could, and he had been met constantly, as he was sure their chairman must have been, with the difficulty of putting plaster upon old rough stone walls, because the rough stonework was almost always set in advance of the quoins and other wrought stonework. He thought it would be found difficult to apply the delicate plaster used on the Romanesque walls to walls of excessively rough materials, as the layer of fine plaster was not more than the eighth of an inch thick; and he thought that, when they found the rough stone-work of the walls project in front of the building, they might with certainty assume that they were not meant to be plastered. It seemed to him to be only a common-sense proceeding not to plaster a wall unless they intended to paint it. If the chairman recommended them to leave the walls unplastered till they could paint them, he (Mr. Street) agreed with him; but if he recommended the plastering of the walls at any rate, and that they should wait for some one to paint them, he could not agree with that advice.

Mr. WILLIAM WHITE, Fellow, remarked that there was, besides the distemper and fresco, quite a distinct mode of painting in old examples, the exact nature of which they did not know. Whether it was a description of the tempera, so often referred to in old works, he could not say, but he thought it would be found: it did not come off in the same kind of way that other modes of painting did when the various colour-washes were picked off the plaster. He had met with it in several instances, and in one case it had been apparently hacked to make a subsequent coat of thin plaster or colour-wash stick to the wall, preparatory to later distemper. There was the gable wall over the chancel arch in Beaminster church, Dorset, which appeared to have been done in that way. He was greatly disappointed, on his return a few weeks after he had first seen it, at finding that they had stuccoed it over instead of leaving it simply in its unrestored state; for there was a very superior tone of colouring about it, the general effect of which would have been quite passable, irrespective of the interest of the painting, although it was greatly damaged. He had often wished some one would take up that kind of work to see whether it could not be discovered what the mode of painting was. It had a brilliancy which tempera had not, and was more like fresco in effect, though it was not plastered into the lime as fresco was. He thought it might lead to the adoption of some similar process now which might prove superior to modern modes.

Professor KERR, Fellow, remarked with respect to the composition of such fine plaster as had been referred to, that examination would probably show that it was made of carbonate of lime, wholly or in part, instead of sand. Instead of using a set coat made of lime alone (as at present the practice), this being a very weak and perishable material, if there were added a certain quantity of ground mason's dust, he believed this would form the superior plaster required.

Mr. THOMAS MORRIS, Associate, said the ancient Italians pulverized marble for sand, as well as burnt it for lime, so that their stucco was homogeneous. This was the composition on which the early mural designs in the tomb of Caius Cestus, at Rome (illustrated by Piranesi), were presumed to be executed; and they remained tolerably fresh up to the present time. Since the works of the great masters were produced, failure in fresco appeared to be the almost invariable rule; and recent specimens were so touched up with tempera and other colours that their original character was seldom preserved. We had been lately indulging the most sanguine expectations from the employment of water-glass; but if the success of that process were also to be doubted, we seemed likely to be again thrown upon the open sea of uncertainty.

The vote of thanks to Mr. Cutts having been seconded by Mr. W. A. Boulnois, was passed unanimously.

AN ACCOUNT OF THE REPAIRS LATELY EFFECTED AT THE TEMPLE CHURCH, LONDON.

By J. P. St. Aubyn, Fellow.

Read at the Ordinary General Meeting of the Royal Institute of British Architects, May 16th, 1864.

I BELIEVE the first attempt at restoration at the Temple Church was in 1825-27, when some buildings, which stood on the south side of the Round Church, and were incorporated with the Chapel of St. Ann, were removed, and the chapel destroyed to the level of the ground. It was then, I believe, that the rubble face of the south side of the Round Church was cut away, and the Bath-stone ashlar and a parapet substituted. Other repairs were also done at this time to the interior.

The second restoration, which was very extensive, comprised the whole of the church excepting the north side, or one-half of the exterior of the Round Church and a considerable part of the porch. You all know the extent of these repairs, and doubtless have heard of their cost.* The late, or third restoration, embraces only the repairs of the north side of the Round Church, the re-roofing of the clerestory, and the external repairs of the porch.

The few observations I have to address to you will be devoted to pointing out some of the peculiarities and features that have been brought to light during the progress of these last-mentioned works; in which Professor Sydney Smirke, R.A., acted as Architect to the Society of the Inner, and myself in the same capacity to that of the Middle Temple.

After frequent meetings and negociations between the members of the "two Temples," the Benchers agreed to adopt my suggestions and to remove the whole of the buildings standing on the east side of Inner Temple Lane, and to throw open the principal part of the space so cleared.

This done, the melancholy state of this part of the church was apparent. The soil had accumulated about six feet, and all sorts of disfigurements and mutilations were shown to have been committed on the building.

A heavy brick parapet surmounted the table course of the eaves, and within this was a lead gutter. The first operation, of course, was to excavate the ground to its original level, and so to ascertain the extent of the repairs necessary to be undertaken.

This was done. A photograph taken at the time shows the state of the walls tolerably well. The buttresses and their sets-off were much mutilated, and all the dressed work of fire, or Reigate, stone had quite perished; but the other stone-work, apparently of coarse oolite, had stood very well.

The north arch of the porch, the only one of the three not tampered with, was in a very shattered and almost falling condition; but, by great care, we were able to preserve it, as well as the north-west pier and the ancient groining which covered one-half of the porch.

The first point in the restoration was to decide as to the finish of the roof at the eaves. I had little doubt, from the result of investigation, that, when first designed, the roof had hanging or dripping eaves; a parapet, therefore, as adopted in 1825, on the south side, was, in my opinion, a mistake. A stone gutter was then proposed; but this was open to the same objection as the parapet, viz., that it was adding something on the walls, for which there was no existing authority. An iron or lead gutter, resting on the table course, was then suggested; and the result is the cast lead gutter which you now see.

---

* Full notices of these are to be found in Addison's History of the Temple Church, 1842; Billing's Architectural Illustrations, 1838, and an Account of the Temple Church, by Sydney Smirke, F.S.A., in "Weale's Quarterly Papers," vol. ii., 1844, to which latter a variety of illustrations of decorations, woodwork of stalls, &c., is appended.

The buttress sets-off were the next difficulty. The eastern one is quite different in profile from the other two, and appears to have been re-built on the top of the plinth course of the original buttress, about the beginning of the last century. The two remaining buttresses had been much mutilated; but, by a very careful examination, stone by stone, of the overlaying parts, as they were removed, I think we can state with tolerable certainty that the original profile has been reproduced.

I should here mention that the front faces of these buttresses are not in a right line, but curved, and form parts of the arcs of circles, the centre of which coincides with the centre of the Round Church itself. This is necessary, in order that the buttress face may unite with the curve of the table course at the eaves.

The restoration of the remaining features of this portion of the work was comparatively easy; a bit here and a fragment in another place giving sufficient data whereby to complete the wanting parts. As I have said before, the Reigate stone, whether in ashlar or otherwise, was very much perished: this we have replaced with Bath stone. The nook shafts, which had all disappeared, have been replaced with red Mansfield stone. The caps of these shafts are curious, and very similar to those of the arcades running round the inside of the Round Church under the windows. The bases are uncommon in form, the profile being very flat. The walling is of rough Kentish rag stone, in irregular or random courses. This has been made good, as nearly as possible to harmonize with the old work; and, although abundant proof remains to show that the whole external face of this walling was covered with a thin coat of plaster, filling in the hollows and just covering the surface of the rough stone, still we have not been bold enough to re-adopt this mode of finishing the surface of the walls; but the pointing, which has been substituted for it, will not prevent the more ancient mode of finish, should it at any time be considered desirable to revert to it.

On the walls are tracings of the mason's marks found on the outer surface of some of the stones.

I need hardly mention that the ashlar was all shaped and worked with the stone-axe. This mode of dressing we have adopted in all the new work, and the modern "drag" has not been used.

I now come to the porch, the date of which, as far as I know, has not been ascertained: it is certainly later than the round church of 1185. This is clearly ascertained by the existence of the foundations of what would be the two western radiating buttresses, and by the top course of each of these buttresses still remaining under the eaves-course. A further proof also occurs in the breaking off of the plinth; that of the porch being quite different from that of the round church, against which it abuts. I venture to think it occupies a date between that of the round and of the square church; and I am inclined to agree with what is conjectured by Britton in his account, given in his Architectural Antiquities, viz.: "That the exterior walls of the round church, with the great western door, are the remains of the original building of 1185, but the six clustered shafts within, with the superincumbent arches, are of later date." Now, I think it may be safely asserted that even this part of the church is earlier than the square church, from which it differs in detail, as well as in the shape of the arches; and I conclude that the porch and the arcade of the round church are of one and the same date. I propose, therefore, as I have said, to place the porch between 1185 (the known date of a part, at least, of the round church) and 1240, the date of the square church; but very soon after the earlier period. This opinion might be subject to confirmation or otherwise if the outer wall could be stripped; but I have not had an opportunity of verifying my theory by this test.

The wheel window could not have been part of the original design of the west front; and, the ornaments on this so closely resemble those of the capitals of the porch, and the caps to both are so nearly alike in form and character, that I assign the insertion of the window to the same date as the porch. Great care appears to have been taken to keep down the roof of the porch so as not to obscure the light to the window. The stone vaulting is for this purpose finished in a very peculiar way; the outer face or back of the vaulting did not follow the same curve as the under face, but was straight; that is, the back is formed sloping, like a roof, and on this was laid the boarding (to carry a lead roof), as evidenced by the impress of the boards still remaining on the mortar. By this means the roof was kept very low, and it does not obstruct the light to the window.

The drawing shows the state of the north arch of the porch. Sufficient was found to indicate very nearly the exact form of this front; the dip of the string is peculiar, and, I fancy, gives an apparent height to the gable, which it wants. I am sorry, therefore, I was not allowed to repeat the same arrangement on the other side. The parapet is conjectural, although there is evidence to show that one did exist.

The base of the porch buttress was found to exist as high as the top of the plinth. So far the restoration of the buttresses is complete: but as to the sets off and their height we have nothing to guide us. The bases and caps are peculiar in design. Observe the folds in the one, and the extreme flatness of the other. The wheel window is curious and beautiful; observe the cusps, caps, and bases; and the mode of fitting the work together, with a wedge piece between each voussoir. On each stone of the enclosing circle a centre line was scratched, which would show, I think, that the shape of each stone was drawn on the flat and then cut to the lines, instead of using a templet or mould, as is the modern practice.

This part of the church being finished, it was determined to remove the parapet on the clerestory, or upper Round, and to substitute a lead gutter, as on the aisle, and to roof it with a steep cone, at an angle of sixty-five degrees, rising to a total height of 105 feet from the ground to the top of the lead knop; the iron work, with cock, is 11 feet more. Inner Temple Lane now presents a far different aspect than when enclosed by high buildings on each side. A desirable object still remains to be accomplished, viz., the lowering of the surface of the lane by a somewhat sharper descent, thereby freeing the porch on its west side, as its present buried look detracts much from its appearance.

When the accumulated soil was removed, the stone coffins, which you see in the photograph and also on the plan, were discovered; but, I am sorry to say, in a very mutilated state. Very few were at all perfect, and all had been opened and filled up with rubbish and human bones. The coffins have been patched merely to keep them together, no attempt having been made to amalgamate the "repairs" with the ancient work; and, upon consideration, it was thought better to allow them to remain on the surface of the ground at the levels at which they were found, and where they may be now seen. The bones and rubbish in the coffins have not been examined. There are fragments of inscriptions on two of the lids, one quite unintelligible, the other, thus—

T. PҺILIPPVS
ҺILĀRIO

which Mr. Walford, who writes in the Archæological Journal (No. 78, 1863) supposes to be

+ HIC IACET PҺILIPPVS DE SANCTO ҺILARIO.

The ground around the church abounds in fragments of bones; but no whole skeletons were found, excepting two discovered in digging the foundations of Goldsmith's Building. These were without coffins, and nothing of interest was found with them: doubtless all the graves were well ransacked when the cemetery was turned into building ground.

It now only remains for me to mention St. Ann's chapel, which stood on the south side of the Round Church. A ground plan of this building is shown in all the earlier plans of the Temple church; and its outline is given in a plan made by Mr. Hakewill, in 1825, when unfortunately it was destroyed. The only elevation I have seen is from a drawing in the British Museum, copied into "The Builder," March 20th, vol. 20, 1862. As I have said, the whole of the shops on the south side of the church were destroyed in 1825, and with them all traces of the chapel and its crypt above ground. However, in cutting a drain for Goldsmith's Building, we came across the remains of the crypt, from which the rubbish has been cleared, and the remains covered with stone landings, with an opening at one end, so that it can be entered and viewed at any time. A few fragments of the vaulting ribs and other stones were found, as well as a few encaustic tiles. The drawings shew the south wall of the crypt as far as it remains, with the plastering, which is of very fine material, jointed with red lines.

MR. W. A. BOULNOIS inquired whether the timbers of the new roof were of oak.

The Chairman, EWAN CHRISTIAN, V.P., said that had not been stated by Mr. St. Aubyn. He added, he was sorry Mr. Street had not waited to hear the confirmation given in this paper to his (the Chairman's) observations about plastering walls. With respect to the Temple Church they must all admit that the form of roof introduced was an improvement, and he was glad to find that Mr. St. Aubyn had restored the lead gutters. Ancient examples of these gutters were now getting rare: but there were a few beautiful ones still remaining in the country—one on the choir of Lincoln Cathedral. It was, however, disappearing by degrees, and every time he went he feared to see another piece gone. It was a beautiful parapet, in cast lead, ornamented with enriched panelling. There had been similar gutters at Canterbury Cathedral, but little now remained. Last year at a village church in Dorsetshire he saw a very simple and beautiful lead eaves gutter such as he thought might be more generally introduced, instead of the cast iron gutters which required frequent painting, and soon got out of order. He was sure the meeting would be unanimous in agreeing to a vote of thanks to Mr. St. Aubyn for his paper.

Royal Institute of British Architects.

REPORT of the Committee appointed by the Council of the Royal Institute of British Architects, 2nd March, 1863, *for the Purpose of making experiments on Artificial Stone.*

YOUR Committee met on the 11th of March, 1863, and at once issued notices, and advertised in the public journals, that it was desirous of receiving prospectuses or other information connected with the manufacture of Artificial Stone; and resolved—

That each patentee be informed that this Committee proposes to report merely on the actual facts which may appear in the investigation;

That, so far as possible, the various materials used in the investigations be supplied under the immediate supervision of this Committee;

That Mr. C. H. Smith, Honorary Member, be added to this Committee;

That some eminent Chemist be associated with this Committee, in order to assist it in the investigation of the processes [Alfred White, Esq., was thereon added]; and

That each patentee be requested to inform this Committee the proceedings he would propose to adopt with regard to the investigation of his process.

It received responses from Messrs. Coignet, Ransome, Bodmer,* and Wheeble.†

Mr. Charles M. Westmacott put forward his patent cement and plaster; and although they are, perhaps, beyond the scope of the Committee, it was received by them, on account of the interest that had been shown in the patent at the meeting of the Institute on the 23rd of February, 1863.

The Committee met eleven times at Mr. Dines's, Grosvenor Road, twice at Mr. Tracey's, and once at Mr. Ransome's, in Cannon Row, exclusive of a visit to his works at Ipswich on the 15th of December last.

On the first meeting, at Mr. Dines's, the Committee met Mons. Coignet for two successive days (7th and 8th of April, 1863), who prepared before it various blocks of his patent béton, which were experimented upon at future meetings (Table A). The Committee, having had regard to the state of the materials after exposure to atmospheric influences, and the reverse, the results in these as in all its other experiments, may be taken as certified by the extreme care that it has taken, and are herewith appended in tabular forms, A, B, C, D, E, and F.

The Committee met in Cannon Row on the 15th of May, 1863, and Mr. Ransome thoroughly explained, in the most open and satisfactory manner, his process; but, as he stated that he could not, on so small a scale of manufacture, and without machinery, provide fair samples, it permitted him to prepare (from moulds supplied) samples at his works at Ipswich, and to forward them to London, guaranteed by him, to be experimented upon before it. The Commitee, however, not being satisfied with the results, thought it advisable to see samples made, and intimated its wish to Mr. Ransome, who most liberally received it at Ipswich on the 15th of December last, and exhibited his mode of manufacture on a large scale. Specimens from the moulds, supplied by the Committee, were made before it, which were tested afterwards in London; and subsequently he likewise prepared others from the same moulds, which were tested in like manner. The results are appended in Table B.

---

* Patent Stone Bricks.

† Reading Abbey Stone.

The Committee deemed it advisable, for the better understanding of these results, to institute experiments upon other materials, as a means of comparison, the results of which are appended in Tables D, E, and F; and it would particularly direct your attention to Table D, showing a series of experiments, suggested by Mr. John W. Papworth, on cubes of Portland stone, 2″, 4″, and 6″ in height, by their respective beds, cut from a carefully-selected block 2′,0″ cube. The deductions to be drawn from this table appear to be, that the results obtained from crushing small cubes of 2″ and under on the side, as usually given in accepted tables, must be received with considerable caution, inasmuch as, while a 2″ Prisms 2″ + 2″ bore 1·5 of a ton put on the square inch, and 2″ Prisms 4″×4″, and 2″ Prisms 6″×6″, nearly 2·5 tons, yet 6″ Prisms 6″×6″, and 4″ Prisms 4″×4″, only bore 1·9 of a ton on the square inch, showing that the strength certainly increased with the size of the area, but apparently not in any definite proportion; while it was observed in these experiments that the height had considerable influence upon the ultimate resistance, a result not expected in contradiction of the usual neglect of the height until that element exceeds six times the diameter.

From Table F it appears that the cohesive power of cements may be classed in the following order: Martin's, Portland, and Roman; but it must be borne in mind that none of these had been exposed to atmospheric influeuces; yet the very remarkable differences, without any appreciable cause, in the results of the various experiments, shows that the strength of cements is a subject upon which no satisfactory theory has yet been definitely propounded.

The Committee trusts that the time required for preparing and testing, at given intervals, so many and various materials, will be sufficient reason for not laying the Report earlier before you; and it will be seen, from the extreme variation in the results given by the experiments, that the Committee is justified in repeating the experience of all zealous investigators; viz. that, without regard to the well-known inapplicability of general formulas to particular works, the Council must not be surprised at finding that the Committee will not draw peremptory deductions from even the experiments made, considering that the least number, to arrive at anything like a perfect conclusion, should be more than twenty of each size of every material: the Committee felt that it had no right to exact so much time and expense as thereby would be required from the professional gentlemen of your Committee, or from Mr. Dines, who personally superintended the details of each experiment; and, moreover, it had no funds placed in its hands by the Council for that purpose.

The Committee feels anxious to express its sense of the liberal and zealous manner in which Mr. Dines put the resources of his establishment, and his own time, at its disposal, furnished the samples and materials from which most of these experiments were made, and suggested the form which it believes to be quite novel of moulds for those to prove by tensile strength the cohesive power. (*See* Table F). The Committee otherwise could not possibly have carried out the experiments to the extent which, however incomplete, has furnished, it believes, as far as they go, a very trustworthy parallel of the strength of materials, deduced from specimens of a larger size—viz.,4″ cubes—than has generally been adopted. The Committee requests the Council to propose to the Institute a special vote of thanks to Mr. Dines.

The Committee, feeling that a fair investigation of the results given in the Tables herewith submitted would require much time and labour in the deduction of the main inferences to be drawn therefrom, as regards the object for which the Committee was appointed, have not hesitated to take so much trouble as to enable it to submit to the Council in a few short sentences the opinions formed upon the processes submitted.

Mons. COIGNET's process is admitted to be highly successful on a large scale in Paris; but the majority of the cubes prepared by him do not appear to be much stronger under pressure than ordinary concrete, and inferior to Bath stone, although they improve by age (*see* Table B.); and this weakness is impugned by him as a result on the ground that the samples were made out of his factory, and that he had not all the appliances requisite at command. A step, landing, and bas-relief made, in April, 1863, from the sweepings of refuse used for making blocks for experiments, are still at Mr. Dines's, and having been exposed to the weather, as well as to wear and tear, appear to stand as well as Portland cement.

Mr. **Ransome**'s process appears to be founded on scientific principles, and, theoretically, ought to answer. The Committee finding that there must be some difficulty in ensuring the complete combination of the ingredients and reporting that few of the specimens especially prepared for it were thoroughly successful in that respect, and, similarly, but few of those made in its presence. (*See* Table B). There is an important difference between these and Mons. Coignet's examples, that Mr. Ransome is not able to declare that his process is highly successful on a large scale, but represents that he has not yet completed the appliances to put it into operation. In some of his specimens there appears an improvement as they advance in age; but so irregular is this that no reliance can be placed upon that feature. But it would seem that if the process of penetration is complete the ultimate strength is attained in a short period, and that the external influences of weather had little effect upon them in that respect. The Committee feels that if Mr. Ransome can ensure the perfection of his entire process, restrict himself to the production of work for each occasion as it may arise, and (for the sake of artistic excellence) avoid becoming a manufacturer of casts from a certain number of moulds, it is possible that for external decorative purposes there is a large field open to him; but they are of opinion that, as yet, Mr. Ransome has not rendered his material suitable for the chisel of the carver or the tool of the modeller.

Mr. **Wheeble** (Reading Abbey Concrete Stone) sent moulded bricks, made at Reading, from the works to the Committee, and they seem to have an ultimate strength, apparently produced by the use of stone lime, from Bridgewater, equal to that of common stocks; the latter, however, possess the advantage of not yielding until the instant of disintegration. The 4″ cubes made in moulds supplied by the Committee, and in its presence, never attained the strength of concrete except in a case where large gravel or flint was the chief ingredient (*see* Table C).

Messrs. **Bodmer** (Patent Compressed Stone Bricks) expressed their inability to comply with the requisitions of the Committee as to 4″ cubes, as the moulds of their press were of ordinary brick size; and if their material were pressed by manual labour into 4″ cube moulds it would not represent the artificial stone which they were in the habit of producing. The Committee accepted accordingly bricks supplied from their works, which show a steady progressive increase in strength as they advance in age; and the results justify the statement made by Messrs. Bodmer, that after six weeks to two months the bricks are fit for use (*see* Table C).

The Committee regrets the unfortunate inability of Mr. Charles Westmacott to put himself satisfactorily in connection with persons having at their disposal the premises and materials which he required for the display of the qualities of his processes. These chiefly depend upon the mixture of natural materials before adding water. The Committee has been able, however, to test one or two experiments, which result in giving it a favourable opinion of the system adopted by him, both for ceilings and for composition applied internally or externally. These may still be seen in Mr. Dines's yard, having been exposed through last autumn and winter. The quick stucco, for rendering ceilings, was tried in the month of May, 1863, consisting of unslacked lime, chalk, and sand, mixed pure, before adding water; it occupied in making and setting twenty minutes, was followed within an hour by ordinary guaged stuff, and stood without cracking. Messrs. Francis, of Nine Elms, have recently made arrangements with Mr. Westmacott to apply his processes practically; from their operations on a more extended scale than was possible to be carried on before the Committee, the valuable character of his invention may be more decidedly proved.

Had the results of the experiments now laid before you been more consistent with each other, and had they resulted in conclusions highly favourable to the various processes, the Committee would still have felt bound to impress upon the members of the Profession who have the opportunity of trying novelties, that future experiments for testing the strength of materials should be made on cubes of larger dimensions than have been heretofore employed; and they would suggest that cubes of 6″ sides would perhaps be the simplest and best adapted for the purpose: with regard to time, years instead of months are necessary to enable any one to arrive at practical conclusions as to the durability of any artificial material put forth in lieu of natural ones.

Members of the Institute who wish for any further information on the subject of the details of the processes, and manner of investigation adopted by the Committee, are requested to consider the minutes of its proceedings as an appendix to this report.

The Committee wish to express their best thanks to Messrs. Alfred White and George Burnell for their ready willingness at all times to assist and co-operate with them; and would suggest to the Council that the thanks of the Institute should be given to these gentlemen for their valuable services rendered.

(Signed) A. ASHPITEL, Fellow.
T. HAYTER LEWIS, Fellow.
JOHN W. PAPWORTH, Fellow.
ALFRED WHITE,
CHARLES H. SMITH, Hon. Member.

JOHN P. SEDDON, Fellow, } *Hon. Secs.*
CHARLES FORSTER HAYWARD, Fellow, }

OCTAVIUS HANSARD, Fellow, Hon. Sec. to the Committee.

23rd May, 1864.

APPENDIX TO THE REPORT OF THE COMMITTEE FOR THE PURPOSE OF MAKING EXPERIMENTS ON ARTIFICIAL STONE.

TABLE A.

Table shewing the strength under pressure at different ages of MONS. COIGNET'S *Patent Stone.*

All 4" Cubes. Material supplied and made before the Committee.

Mark.	COMPOSITION.	4 Weeks.		8 Weeks.		12 Weeks.		16 Weeks.		46 Weeks.		56 Weeks.		REMARKS.
		Cracked Tons.	Crushed Tons.	Cracked Tons.	Crushed Tons.	Cracked Tons.	Crushed Tons.	Cracked Tons.	Crushed Tons.	Cracked Tons.	Crushed Tons.	Cracked Tons.	Crushed Tons.	All made in April 1863.
1	Coarse Sand - - 4 Grey Stone Lime - 1 Water 8 per cent.	...	... *a*	...	... *a*	...	... *a*	...	... *a*	...	...	...	...	*a* All broke into powder at the slightest pressure, and were tried bedded in leather and plaster.
2	Fine Sand - - - 4 Grey Stone Lime - 1 Water 8 per cent.	...	... *a*	...	·56 *a*	...	... *a*	...	...	...	...	...	...	
3	Coarse Sand - - 4 Grey Stone Lime - 1 Portland Cement 0·75 Water 10 per cent.	...	...	2·95	5·0	5·45 2· 0	6·75 5·85 *c*	4·2	4·6 *b*	5·0	5·4 *c*	1·0	3·25 *c*	*b* About 1½" in centre rubbish, broke into 4 cones. *c* Exposed to atmospheric influences from time of make.
4	Fine Sand - - - 4 Grey Stone Lime - 1 Portland Cement 0·75 Water 10 per cent.	...	...	1·50	1·80	...	...	1·50 3· 3	3· 8 *d* 7·15 *e* *c*	...	...	...	...	*d* Crushed into powder. *e* Ground surfaces not bedded.
5	Coarse Sand - - 4 Blue Lias Lime - 1 Water 8 per cent.	...	... *a*	...	... *a*	...	... *a*	...	... *a*	...	...	...	...	
6	Fine Sand - - - 4 Blue Lias Lime - 1 Portland Cement 0·75 Water 10 per cent.	...	3·8	1·0	3·90 *c*	...	...	2·8	4·5	3·6	8·0 *c*	...	...	
7	Fine Sand - - - 4 Blue Lias Lime - 1 Water 8 per cent.	...	...	...	... *a*	...	... *a*	...	... *a*	...	... *e*	...	...	
8	Coarse Sand - - 4 Blue Lias Lime - 1 Portland Cement 0·75 Water 10 per cent.	3·4	3·8 *c*	4·0	5·90 *c*	3·6	7·7 *c*	2·2	8·2 *c*	...	...	...	...	

TABLE SHEWING TENSILE STRENGTH.

16 to 1 on sq. inch.

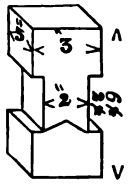
	COMPOSITION.	36 Weeks old.		FORM.	REMARKS.
		Breaking Weight. lbs.	lbs. on sq. inch.	Sketch shewing  form of fracture in each case.	All exposed to influences of weather since made. All broke whilst putting on 2 to 4 lbs. extra.
3	Same as above - -	656	41		
6	Ditto - - -	544	34		
8	Ditto - - -	1168	73		
,5&7	Ditto - - -	448	28		

TABLE B.

Table shewing the strength under pressure at different ages of MR. RANSOME'S *Patent Stone.*

All 4″ Cubes.—*Made at* Ipswich, in Moulds supplied by the Committee.

Mark.	COMPOSITION.	3 Days.		10 Days.		3 Weeks.		4 Weeks.		8 Weeks.		28 Weeks.		36 Weeks.		REMARKS.
		Cracked Tons.	Crushed Tons.	Cracked Tons.	Crushed Tons.	Cracked Tons.	Crushed Tons.	Cracked Tons.	Crushed Tons.	Cracked Tons.	Crushed Tons.	Cracked Tons.	Crushed Tons.	Cracked Tons.	Crushed Tons.	All made in April 186 —
31	Sand - - - 4 Coarse Ballast 4 Clay - - - 1	...	9·35 *c*	14·0 4·0	15·25 5·60*c*	...	...	...	...	...	...	...	16·0 *c*	...		*a* split horizontally perpendicularly.
38	Sand - - - 6 Chalk - - 1	5·0 ...	6·05 ... *c*	7·10 8· 0	9·40*c* 13·25*c*	...	...	5·0	5·55	6·8 *a*	8·4 *c*	...	14·0 *c*	7·0	8·4 *b*	*b* indurated from 1″
48	Sand - - - 5 Chalk - - 1	4·0	8·90 *c*	...	. .	...	...	4·15	8·6 *c*	3·9	*b* 6·3 *c*	...	14·0*c* 14·0*c*	2·4	2·9 *d*	*d* bore without the effect previously tested by Mr. R. 20 Tons.
10	Sand - - - 5 Fine Silex - 1	...	...	...	...	...	30·0 *d*	...	...	...	...	...	35·0 *c*			*c* all exposed to spheric from time of
58	All road scrapings from neighbourhood of Ipswich	...	28·0 *c*													

4′ Cubes. *Made before* the Committee at Ipswich, Dec. 15, 1863.

Mark.	COMPOSITION.	10 Weeks.		15 Weeks.		17 Weeks.		REMARKS.
		Cracked Tons.	Crushed. Tons.	Cracked. Tons.	Crushed Tons.	Cracken. Tons	Crushed. Tons.	
38	Same as above -	2·4 ...	7·0 *f* ...	... ...	6·75 *h* ... *k*	3·5 5·5	6·75 *h* 8·75 *h*	*f* exposed through hard frost, indurated from 1″ to 3″.
48	Same as above -	5·8 ...	7·4 *f* ...	4·0 ...	6· 2 *h* ...	4·0 4·0	8· 0 *h* 8· 0 *h*	*g* exposed from Dec 30, to Feb. 23, not indurated, and very wet.
31	Same as above -	... ...	... ...	... ...	... ...	6· 0 4·30 8· 0	6· 0 *h* 5· 5 *g* 8· 0 *h*	*h* none thoroughly indurated, not exposed.
10	Same as above -	... ...	... ...	14·8	16·1 *h*	·50 3· 0 4· 0	4· 5 *g* 4· 5 *h* 9· 5 *h*	*i* apparently all sand, only indurated on surface.
34*	... ...	...	...	1·0	... *h* *i*	...	...	* composition not given.

Note.—Mr. Ransome states respect to the examples made he misunderstood the wish of mittee, and prepared them sole his process, and for exposure spheric influences, and not to by crushing.

9′ Brick. *Made before* the Committee.

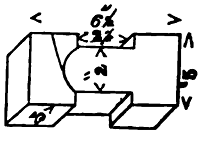
Mark.	COMPOSITION.	13 Weeks.		
R.I.B.A. A.	Sand Ballast - 4 Fine Sand - 4 Chalk - - - 1	14·0	35·0	Never exposed to atmospheric influences and never washed.

9″ Brick. *Made at* Ipswich.

Mark.	8 Weeks.		
38	6· 0	6·65*	* Induration not complete. All exposed to atmospheric influ
„	20·15	38· 8	
48	4· 2	30· 0	

TABLE SHEWING TENSILE STRENGTH.

Made at Ipswich.

Mark.	COMPOSITION.	3 Days old.		28 Weeks old.		REMARKS AND FORM.
		Breaking Weight in lbs.	on sq. inch lbs.	Breaking Weight in lbs.	on sq. inch lbs.	All exposed to atmospheric influences from time of make.
38	As above - - -	......	......	752 1184	47 74	
48	As above - - -	... ..	......	1104	67	
58	As above - - -	1616 1552	101 97	....	....	Sketch shewing form of fracture in each case.

Pipes 18″ long 12″ diameter external, 1½″ thick, broke with 80 lbs. and 100 lbs. on the square inch—same composition as 48.

In all cases the composition was mixed with the Soluble Silicate of Soda in proportions of one gallon of Silicate to one bushel of sand saturated with a solution of Chloride of Calcium and afterwards washed in water, except sample R.I.B.A. A.

TABLE B.—*continued.*

Comparative Table of MESSRS. COIGNET'S & RANSOME'S *with other Materials under Pressure.*

4″ Cubes.

	Mark.	4 Weeks.		8 Weeks.		16 Weeks.		28 Weeks.		36 Weeks.		46 Weeks.	
		Crushed. Tons.	Tons. on sq. in.	Crushed. Tons.	Tons. on sq. in.	Crushed. Tons.	Tons. on sq. in.	Crushed. Tons.	Tons. on sq. in.	Crushed. Tons.	Tons. on sq. in.	Crushed. Tons.	Tons. on sq. in.
Coignet Composition. See Table A.	3	...	...	5·0	·31	4·6	·28	...	...	...	...	5·4	·33
	6	3·8	·23	3·90	·24	4·5	·28	...	...	...	...	8.0	·5
	8	3·8	·23	5·90	·37	8·2	·51	...	...	...	...	...	...
Ransome Composition. See Table .B	38	5·55	·34	8·4	·52	8·75	·54	14·0	·87	8·4	·52	...	...
	48	8·6	·53	6·3	·39	8·0	·5	14·0	·87	2·9	·18	...	...

MATERIALS.	3 Weeks.		REMARKS.
Portland Stone Bas Bed	22·2	1·4	average of 7 examples.
Caen	14·0	·87	
Bath (Corsham)	8·41	·52	
„ (Box)	6·05	·37	
Concrete—1 Slack Lime 3 Ballast	5·2	·32	3 weeks old.

TABLE C.

Table shewing the strength under pressure at different ages of WHEEBLE'S *Patent Concrete Stone (Reading Abbey).*

4″ Cubes. Materials *made before* the Committee in Moulds supplied.

COMPOSITION.	3 Weeks.		8 Weeks.		16 Weeks.		36 Weeks.		REMARKS.
	Cracked. Tons.	Crushed. Tons.	Cracked. Tons.	Crushed. Tons.	Cracked. Tons.	Crushed. Tons.	Cracked. Tons.	Crushed. Tons.	
Coarse Gravel Hydraulic Lime (Bridgwater.)	1·6 1·8	2·0 *a* 2·1 *a*	3·7	12·3 *b*	...	...	1·7	3·5 *c*	*a a* Fell to pieces, no large stones. *b* A quantity of large stones. *c* After exposure to atmospheric influences from August 1863, to February 1864.
9′ Bricks.									
Same as above	...	...	6·75	20·5 *d*	5·30	14·75 *d*	...	...	*d* A large proportion of stones, which resisted crushing, really destroyed at point of cracking.
9″ Bricks. Made at Reading.									
Same as above	2·8 8·0	12·5 *d* 26·0 *d*	... ...	... ...	... ...	... ...	... ...	... ...	*d* ditto

Table shewing the strength under pressure at different ages of BODMER'S *Patent Compressed Stone Bricks.*

9″ Bricks. *Supplied* to the Committee.

COMPOSITION.	4 Days.		11 Days.		18 Weeks.		22 Weeks.		63 Weeks.		REMARKS.
	Cracked. Tons.	Crushed. Tons.	Cracked. Tons.	Crushed. Tons.	Cracked. Tons.	Crushed. Tons.	Cracked. Tons.	Crushed. Tons.	Cracked. Tons.	Crushed. Tons.	
Silicious Sand 7 Hydraulic Lime 1	under a	Ton	1·4	3·77	2·4	3·9	2·0 2·3	5·4 6·95	7·8	20·0 *m*	*m.* The ram at this point being leaky the reading is doubtful.

TABLE D.

Table shewing the results under pressure of Cubes 2″ 4″ and 6″ in height, by their Base.

Portland Stone.

(*Brown bed*).

HEIGHT.	Base.	Cracked.	Crushed.	on sq. inch.	REMARKS.
	″ ″	Tons.	Tons.	Tons.	
2″	2 × 2	...	3·2	0·8	At once.
”	2 × 2	4·0	6·0	1·5	
”	4 × 2	...	20·2	2·5	At once.
”	2 × 6	21·0	23·5	1·70	Across the Bed.
”	4 × 4	8·0	41·0	2·5	
”	6 × 6	64·0	86·0	2·4	
4″	2 × 2	...	3·0	0·75	
”	4 × 2	...	17·0	2·12	
”	4 × 4	25·75	29·25	1·82	
”	4 × 4	24·25	28·75	1·85	
”	4 × 6	31·0	45·0	1·87	
”	6 × 6	48·0	82·0	2·27	*a* Very slight, external.
		a	*b*		*b* Not crushed.
6″	2 × 2	2·8	3·4	0·85	
”	6 × 2	...	10·0	0·83	
”	4 × 4	18·0	20·45	1·27	L To Bed.
”	6 × 4	28·0	32·0	1·33	
”	6 × 6	64·0 *c*	70·0	1·94	*c* Very slight.
”	6 × 6	55·0	68·75	1·90	

TABLE E.

Table shewing strength under pressure of different Materials.

4″ Cubes.

MATERIALS.	Cracked	Crushed	on sq.in.		REMARKS.
STONE—	Tons.	Tons	Tons.		
Portland.					
„ Brown Top Bed	...	26·7	1·66	average 1·11	went at once.
„ „ „	19·8	23·0	1·43		at L to bed.
„ „ „	17·8	19·0	1·18		at L to bed.
„ „ „	16·7	17·5	1·09		
„ „ „	14·1	16·2	1·12		at L to bed.
„ „ „	...	15·8	0·99		went at once very shelly
„ „ „	7·5	12·2	0·76		split both horiz. & perp.
„ „ „	10·6	11·5	0·70		
„ Base or Best Bed	32·6	36·2	2·25	average 1·42	split horizontally.
„ „ „	13·5	28·0	1·75		
„ „ „	26·4	27·0	1·68		
„ „ „	18·0	20·1	1·25		on bed.
„ „ „	16·4	16·5	1·31		„
„ „ „	11·4	14·4	0·90		L to bed.
„ „ „	13·3	13·4	0·83		„
Mansfield.					*a* at 28·0
„ Red - -	39·0*a*	40·1	2·5		scaled off in small pieces.
„ „ - -	49·7	68·8	4·3		both very fetid.
„ White -	21·5	36·4	2·27		scaled at 21·5
„ „ -	12·0	24·0	1·5		
Forest of Dean—White	17·5†	47·8	2·98		† slight crack, external only.
„ „ „	43·0	45·0*	2·81		* not considered very best.
„ „ „	30·0	40·0	2·5		all broke suddenly like iron.
„ „ „	38·0	39·4	2·46		
Bath.					
„ Corsham - -	8·0	8·84	·55		
„ „ - -	...	8·3	·51		crushed suddenly.
„ „ - -	7·5	8·1	·51		
„ Box Best Bed	...	5·4	·32		
„ „ Ground „	...	8·6	·53		broke at once into 4 cones.
„ „ „	5 7	5·85	·36		
„ „ „	...	4·35	·32		
Caen - - - -	8·2	15·4	·93		
„ - - - -	7·5	12·7	·79		
Gypsum.					
Derbysh. Alabaster	10·9	11·0	·72		
Marble.					
Cornwall Serpentine					
„ Poltesco Green	25·0	52·0	-		at 15·4 slightly at 40· going fast, smashed.
„ Signal Staff Blk. & Rd.	10·0	51·0	3·2		smashed.
„ „ „	10·50	37·75	2·35		
SLATE—					
North Wales.					
Machynlleth -	...	83·5*a*	5·21	average 4·086	*a* at 71 a splinter flew off.
Bangor (Penryhn)	...	80·0*b*	5·0		*b* no effect, neither broke.
Portmadoc					
Welsh Slate Com.	20·6	75·3	4·70		
Festiniog ditto -	20·0	70·5	4·40		
„ „	...	63·0	3·93		
Maenoffern - -	23·6	65·4	4·08		
Pen-Machno, Conway	...	48·8	3·05		
Dinorwic, Llanberis	...	49·0	3·06		
Cornwall					
Delabole - -	52·0	61·6	3·85		broke at L to bed.
Ireland.					
Valencia - -	...	57·3	3·58		

4″ Cubes.

MATERIALS.	Cracked	Crushed	on sq.in.	REMARKS.
WOOD—	Tons.	Tons.	Tons.	
Teak, Moulwein	...	50·8	3·17	crushed endways.
Deal, Archangel	...	28·8	1·11	„ fibres torn apart.
CONCRETE.				
1 Lime 3 Ballast -	...	5·1	·31	3 weeks old.
1 Slk. Lime 3 Ballast	...	5·2	·32	
MARTIN'S CEMENT -	...	14·85	·92	22 hours old.
PLASTER, Common -	...	4·95	·30	22 hours old.

9″ BRICKS.

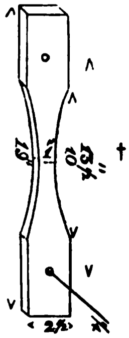
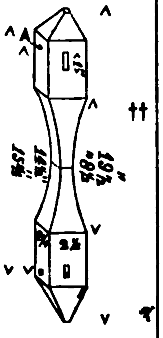
	Cracked	Crushed	on sq. in.	REMARKS.
	Tons.	Tons.	Tons.	
Common Stocks - -	...	30·0	·7407	
„ „ - -	...	18·0	·4432	
„ „ - -	...	12·0	·2962	
„ „ ground sides	22·5	26·8	·6616	
„ „ „ „	...	31·5	·7777	
Burham Brick - -	59·8	73·6	1·817	
„ „ - - -	...	80·0*a*	1·985	*a* Not crushed.
„ „ - - -	...	62·0*b*	1·340	*b* Cracked slightly, not crushed.
Place, bad - - -	8.4	9·0	·2222	
„ „ - - -	8·0	10·7	·2641	
Grizzle - - - -	...	14·0	·3456	
Stocks, 2 joined in Mortar	5·0	8·7	·1071	
† „ „ in Cement	7·0 *	15·35 *	·1896	* Small pieces flew off at intervals, but cement stood.
Place, 2 joined in Mortar -	...	5·3	·0641	† About 14 days old.
† „ „ in Cement	...	9·4	·1160	

Shafts, 12 inches long, 3 inches diameter.

MATERIALS.	Cracked	Crushed	on sq.in.	REMARKS.
STONE—	Tons.	Tons.	Tons.	*All yielded vertically.*
Portland, worked -	7·3	10·25	1·48	bedded in leather.
„ rgh. tooled		8·57	1·00	„ in plaster.
MARBLES (Devonshire)—				
Ipplepen, Mottled Red	9·2	10·7	1·37	
Poltesco, grey-green	4·3	4·3	·60	went across and not with vein.
„ „	...	6·0	·84	went at once.
Signal-Staff, rd.&blk.	...	33·5	4·73	went in fragments.
„ „	20·0	22·5	3·18	„ „ „
„ „	12·75	16·25	2·29	
Cadgewith, grn.&blk.	16·92	17·62	2·49	
WOOD—				
Deal, Archangel - -	...	19·1*a*	2·70	*a* lost 3-16ths in length; point of yielding 5-12ths of length in both.
6″ of above sawn off left,	...	19·3	2·73	
Deal, Archangel - -	...	16·3*a*	2·30	
6″ of above sawn off left,	...	19·4	2·74	
Teak, Moulwein - -	...	18·25*b*	2·58	*b* lost 1-8th and point of yielding about same.
6″ of above sawn off left,	...	18·7	2·64	
Teak, Moulwein - -	...	16·0*b*	2·26	
6″ of above sawn off left,	...	17·75	2·50	

TABLE F.

Table shewing Tensile Strength, form suggested by MR. DINES.

MATERIAL.	Age in days.	Section of Fracture.	Breaking weight in lbs.	lbs. on the square in.	Form.	REMARKS.
Portland Stone - -	...	1·07 × 1·07	304	264 †		
		1·03 × 1·05	432	400		
Sicilian Marble - - - -	...	1·13 × 1·01	1064*	931		
		1·02 × 1·13	1394	1216		* At 800 lbs. not damaged, a slight crack before breaking.
Cements—Martin's - -	3	1·06 × 1·02	344	318 ††	†	
	26	1·04 × 1·02	880	829		
	36	1·05 × 1·03	592	538		
	57	1·06 × 1·02	952	880		
„ Portland pure -	26	1·06 × 1·0	784 *f*	739		
	34	1·06 × 1·05	392 *a f*	352		*a* Broke in the eye.
	36	1·05 × 1·02	728 *f*	680		*b* Put together strong, minimum of water.
	36	1·05 × 1·01	424 *b*	400		
	36	1·06 × 1·05	... *c f*	...		*c* Broken instantly in eye.
	42	1·07 × 1·08	624 *a f*	539		
	42	1·07 × 1·08	536 *a f*	464		
	44	1·1 × 1·04	616 *b*	529		
„ Portland - - 1 „ Sand - - - - 1	37	1·1 × 1·08	88 *d*	74		*d* Mixed soft, maximum of water.
	39	1·02 × 1·08	344 *b*	312		
	40	1·05 × 1·0	172 *d e*	160	††	*e* A small stone in centre of fracture.
	40	1·04 × 1·07	216 *b*	194		
	42	1·0 × 1·01	176 *d*	176		*f* Mixed as usual.
„ Portland - - 1 „ Sand - - - - 2	51	1·09 × 1·02	112 *f*	100		
	53	1·1 × 1·04	160 *f*	149		
„ Roman, pure - -	13	1·04 × 1·07	266 *g*	239	¶	*g* Extra stiff.
„ „ „ - -	18	1·06 × 1·02	208 *h*	192		*h* As usually made, air bubble in fracture.
Plaster, Coarse - - -	4	1·04 × 1·1	88	76		
„ „ - - - -	11	1·0 × 1·1	... *i*	...		*i* Twisted and broke instantly.
„ „ - - - - -	35	1·04 × 1·02	104	98		
„ Fine - - - -	49	1·01 × 1·07	264	244		
	49	1·04 × 1·07	344	309		

SOME OBSERVATIONS UPON EXPERIMENTS ON ARTIFICIAL STONE, &c. UPON READING THE REPORT OF THE COMMITTEE THEREON.

By Octavius Hansard, Fellow.

Read at the Ordinary General Meeting of the Royal Institute of British Architects, May 30, 1864.

Upon the appointment of your Committee last year, for the purpose of making experiments on artificial stone, I was requested by them to conduct the enquiries and superintend the investigation of the processes submitted; and therefore deem it right, upon the presentation of our Report this evening, to offer a few remarks, showing how we proceeded upon those investigations, and some observations upon the results. I regret that we had not more responses to our invitation to patentees; but probably that was owing to the conditions that were laid down by the Council, that we were to enter solely upon the enquiry as to artificial stone. After applying to several firms for the use of their yards to carry on our experiments, we succeeded in gaining permission from Mr. Dines to use his; and he subsequently placed his men, materials, and his hydraulic machine, at our disposal at all times. The gentlemen who had answered to our advertisement were then invited to submit their processes.

In order to test the cohesive strength of the respective materials submitted to us, and by comparison draw some conclusions, we had wooden moulds made, cubes of 4-inch sides. Mr. Dines provided the materials, which were mixed before us, except Messrs. Bodmer's specimens, and some of Messrs. Ransome and Wheeble's; and these were carefully marked, and placed exposed or otherwise, until the time arrived for testing them. The Committee represented to those gentlemen who did not prepare samples before them, that a guarantee as to the truth of their statements would be accepted; but whatever the results, this fact would be made known.

Bodmer's Patent Compressed Stone Bricks, although not absolutely coming under the denomination of artificial stone, were seemingly of so interesting a character that the Committee accepted and tested their strength at various ages. Table C shows you the results.

Mr. Wheeble sent several bricks of the Reading Abbey Concrete Stone, and specimens, 4-inch cubes and 9-inch bricks in our own moulds, were made before us. From Table C, of results, you may perceive how little they are adapted to resist crushing weight, their composition being uncertain; their chief ingredient often being large stones and granite, at other times small gravel. The cubes noted *e*, *e*, three weeks' old, not composed of Bridgewater lime, crushed at 2·0 tons, or ·135 of a ton on the square inch; whilst the weakest of Ransome's, at three days, bore 6·05 tons, or ·378 of a ton on the square inch; and Coignet's, at four weeks, 3·8 tons, or ·237 of a ton on the square inch; and in Wheeble's there seemed little cohesion, as when crushed the lime fell through almost pure.

Mr. Charles Martin Westmacott's process was described on the evening last year, when Mr. Kerr read his paper. He claims, chiefly, the mixing of any carbonate of lime with lime, cements, or with the combination of lime and cements, preparing his mixture in different proportions, and sending it out as lime, the sand being added in the usual manner; his principle being to have always a much larger proportion of insoluble to soluble matter. It hardens by age and atmospheric influences, and is suitable both for internal and external stucco. This latter is composed of one part slaked lime to two of chalk, and can be used either as stucco or as common mortar; or if mixed with cement, as a good cement mortar. If for internal or quick stucco, the combination is one of chalk and two of unslaked lime, mixed pure with sand, before adding water; but for sending any distance, or for keeping, other materials are added.

The first combination, external, is to be treated like lime, and therefore must be used directly. The difference between this and the internal or quick stucco, is that the material used for the latter before being guaged, has been dry slaked; when placed on the wall hardens and sets at once throughout its mass; whilst the other, slacked, is like mortar, hardens gradually, but differs in this respect, that the induration commences at once from the surface, and is continuous.

The chemical action seems to be that all the original carbonic acid being removed from the lime by its original burning, by its mixture with carbonate of lime about ·75 is reinstated, and directly induration is commenced, or the taking up of the carbonic acid (which, in mortar, has to be supplied by the atmosphere in the course of time), until it gradually attains the full amount it originally had in the rock, approximating nearly to the original stone.

Mr. Westmacott tells me that Messrs. Francis can produce his material, as sent out for immediate use, at 8d. per bushel, and the best for keeping at 15d. (of course, exclusive of sand). The samples we had made on the 5th of May, 1863, ¾-inch thick, have been exposed on a wall facing S.E., in Mr. Dines's yard, and have hardened completely. I have here several examples of the quick stucco for ceilings, which were made at four o'clock this afternoon: and you can judge, by inspecting them, their value, at least as to setting and drying. The operation referred to in the report made before us in May, 1863, was similar to one of them.

Mr. Ransome, when invited, stated that it would not be politic for him to manufacture his concrete stone away from his own premises, to which the Committee replied that they did not think it advisable that any experiments on which they had to report should be carried on except under their immediate supervision; they accordingly met Mr. Ransome in Cannon Row, and he explained the principle, and exhibited the details of his process; but stated that what he then made could in no wise be taken as representing either its quality or strength. Amongst other samples, there was made an ordinary 9-inch brick, which was marked, and to which I will again refer. The result of this meeting was, that we were convinced that Mr. Ransome could not make his specimens except at his own works, and he undertook to make the best samples of his stone, and forward them to town, to be tested by us at given intervals. The results upon these experiments tried from May to November were so unsatisfactory to us, and to Mr. Ransome, that a visit to his works was arranged. The results under pressure, Table B, of the samples then made were not at all satisfactory; but Mr. Ransome has subsequently stated that he had no idea at the time they were made that they were to be so tested, having prepared them for exposure to atmospheric influences only. It appears hardly necessary to explain Mr. R.'s process, after that given by him last year in these rooms; but to some it may be interesting to know his process, as witnessed by us.

He first dissolves flints in caustic alkali, at a temperature of 350° Fahr., leaving them in the boiler 24 hours. He then draws off the liquid produced, viz., silicate of soda, and allows it to evaporate until it becomes a thick matter like treacle; mixes it next with clean pit sand, incorporated with five to ten per cent. of chalk, in a pug-mill, in certain proportions, as per Table B; and in four to five minutes this mixture is formed into a stiff putty. It is then pressed into a mould, and placed in a solution of chloride of calcium, and rapidly saturates, resulting in a formation of an insoluble silicate of lime and a soluble chloride of sodium. This latter has to be removed by washing, to effect which it is placed in a hot-water bath for many hours.

From the table B in your hands, you will perceive that the result as to strength is anything but satisfactory, as great variation is shown, even when up to a certain point there is an apparent increase in strength from age; and whenever this is not observed, the retrogration appears always to have been caused by the imperfect combination of the ingredients, the induration not having penetrated the entire cube; and I attribute this to the saturation of the solution of chloride of calcium not being complete, owing to the moulded material being placed in it, rather than the chloride being poured over it; and I am led to this conclusion from the fact that the specimen marked R. I. B. A., and which I said I should refer to, was made before us in Cannon Row, and treated in this manner, it being a brick hollowed on one side, which was gradually filled with chloride of calcium, and took 15 minutes to saturate, perminating gradually. This was taken away by me, never washed at all, and when after 12 weeks it was crushed, was thoroughly indurated; but of course not free from salt, never having had the sodium washed out of it, and bore, as you see, 35 tons or ·863 of a ton on the square inch; as against a specimen brick from Ipswich, eight weeks old, 30 tons, or ·733 of a ton on the square inch; and a 4-inch cube, eight weeks old, or ·437 of a ton on the square inch.

I am bound in justice to Mr. Ransome to state that he invites further investigation, assured that it would lead to other results, and is desirous that anyone should select, at discretion, from the many hundreds of examples, and of every variety of shape, at his works, in order to satisfy themselves that this conclusion is unfounded, and that more reliable results would ensue.

I now come to Mons. Coignet, and as at our former meeting his process was not entered into, I will endeavour to explain it, as exhibited before the Committee.

The materials were supplied to Mons. Coignet, consisting of Thames sand, Medway or Burham grey lime, and Portland cement, and he brought with him a model of his machine for mixing. His process consists of two main operations:—*First.* A complete consolidation of the materials with little water. *Secondly.* The steady but not violent compression of the consolidation in moulds.

Mons. Coignet mixed dry the cement with sand and lime, and, whilst mixing, sprinkled them with a little water. This mixture was thrown into the machine (apparently an endless screw enclosed in a cylinder,) at the rate of two shovelsful of mixture, followed by about a quart of water, until the cylinder was filled. The screw (turned by two men) delivered the mixture through a series of holes in the bottom of the cylinder.

On this occasion Mons. Coignet requested permission to re-pass the materials through the cylinder on the ground, that the mixture produced in the double passage through the model was only equal to that resulting from a single passage through the machine, of 10 to 15 horse power, which he employs in actual work in Paris. The measure used was equal to about the French "litre," or 2¼ lbs., and the proportions of materials about 180 sand; 44 lime, produced by slaking; 33 Portland cement; and 20 water. This mixture, after its delivery from the machine, was put by degrees into moulds, and each layer rammed by a workman.

Mons. Coignet, in reply to enquiries put to him by the Committee, stated, that chalk lime was not sufficiently hydraulic for his purpose; that lime merely delivered as ground had always some core left, and therefore had to be reduce to powder, by slaking it with one-fifth of its bulk of water for forty-eight hours, before employed; and that such powdered lime was equal in effect to two of common ground lime; that when very hard mortar was required it was necessary to use less water and more sand than usually adopted; that the water having evaporated from the mortar as usually made leaves it full of minute holes, and that more the water, less is the crystallization. In the mixture as given above. if cement is used as a twentieth it requires to be twice passed through his machine, in Paris, but if used as a thirtieth, only once; that he found by experience, that the purer the lime the quicker was the crystallization, and that although pure hydrate of lime will take carbonic acid, silicate of lime and alumina will not take it, because silicic acid took the place which carbonic acid did with the pure lime; and frankly admitted that his first experiments, in 1855, in marine works, had not entirely succeeded, but claimed perfect success for his works at Marseilles, since 1859, and for those now executing in Paris and elsewhere.

With respect to the comparative value of Mons. Coignet's and Mr. Ransome's in Table B. From the average of the four examples I have taken, Mr. Ransome's appears to be rather stronger, viz.—Coignet's ·328, Ransome's ·407 tons on the square inch, and whilst in both there is a gradual progress as they advance in age, Coignet's is steady, and Ransome's uncertain; they neither appear much stronger than concrete three weeks old composed of one lime, three ballast, which bore ·31 tons on the square inch, or than Bath stone, which on the average of seven examples, bore ·45 of a ton on the square inch.

With regard to experiments on Table E. showing the crushing weight under which each block lost its power of cohesion, most are made upon 4-inch cubes, on materials carefully selected, and tested by the same machine, and vary very considerably in results;—I have not collated these tables with a view to enter into competition with the giant investigators, Hodgkinson, Fairbairn, Rennie, Clark, Vicat, or others, but to enable you to draw comparisons with the artificial materials now under consideration, or upon any which may be experimented upon at any future period. It must be borne in mind, that the resistance of all materials is seriously affected by various circumstances, viz., the condition of the atmosphere; their own nature, and the time during which the load is left upon them; in all cases an approximation only to the truth can be arrived at. All the specimens experimented upon by us were subjected to a continual action from an hydraulic ram (Bramah), with a self-registering guage in decimal parts, and whose limit was up to 100 tons. The results on these exhibit the care that should be taken upon calculating from tables giving isolated examples of crushing weights, unless made upon large averages. In the one before you, in the eight blocks of Portland stone, top bed, there is a variation of from 26·7 to 11·5 tons crushing weight, or on the square inch from 1·66 to 0·70 of a ton, the average being 17·1 tons crushing weight, or 1·11 on the square inch; and on the seven blocks from the best bed, a variation from 36·2 to 13·1 tons crushing weight, or on the square inch from 2·25 to 0·83 of a ton, the average being 2·25 crushing weight, or 1·42 on the square inch. As in bricks so in stone, the resistance is modified by the mortar or cement inserted in the joints, and authorities on this subject seemed agreed that in practice it is only safe to allow executed work to be weighted with a load equal to one-seventh of the crushing weight, and when materials are small, such as bricks, or stones of small dimensions, rubble, &c., one-tenth would appear to be the safest limit.

The results on bricks show the truth of the oft repeated statement, that as everything depends upon their thorough-burning, no reliance can be placed upon any results obtained from experiments made upon them. You have here common stocks, of a good make, picked haphazard, crushing under weights, the maximum being 31·5 tons, the minimum 12·0 tons, whilst the same stocks joined in mortar and cement, two weeks old respectively, crushed at 8·7 and 15·35 tons.

I would draw your attention to the examples of the shafts 12-inch long, 3-inch diameter, which are somewhat interesting from their respective fractures. This Devonshire serpentine, Poltesco grey green, one of the weakest examples, went across and not with the vein, which in this shaft runs in the line of the diameter, and to those of wood, which after yielding about five-twelfths of their length, the remainder not injured was sawn off, and again tested, and bore a greater resistance than the whole length originally. The deductions to be drawn from the table of samples, suggested by Mr. J. W. Papworth, on cubes of Portland, of various heights, by their respective beds, have been given in our report.

The Table F., giving examples of the strength of materials, particularly cements under tension, are from moulds suggested by Mr. Dines, the variations of which are very singular, but no doubt these are to be attributed to the absorbing power of the materials, as in Roman or natural cements, if, at the moment of application, they be so dry as to draw from the cement the water necessary for its crystallization the resistance is less, and in those examples where lime is a principal ingredient much depends upon its being sufficiently burnt.

I believe I have now brought before you all the chief points resulting from our investigations, and I fear that I have wearied you with these hard, dry details. Before concluding I must take this opportunity of thanking those gentlemen with whom, during these investigations, I have associated, for their courtesy and ready willingness to render me any assistance, and especially to Mr. J. W. Papworth, who was present at all our meetings, (sixteen) varying from five to seven hours each, and who was most active in assisting and carrying out these experiments. When I was requested by the Committee to conduct these enquiries, I accepted the office with great diffidence, having had but little experience in such matters; but I shall not regret the time and trouble involved during the past fifteen months if I have succeeded in satisfying you with the results, and if from them attention may be awakened on the part of any towards acquiring a sufficient number of facts from actual experiments, whereon to found the basis of a correct knowledge of the strength of materials, and determine on the properties and suitability of new inventions for building purposes.

PROFESSOR KERR, on being called upon, reminded the meeting that a paper which he had read last year had given rise to this enquiry, and that he had had the honour of being put on the Committee, although he had not, as it happened, attended any of the meetings. He had listened with great interest to the report, and to Mr. Hansard's further description of what had been done; and, of course, one could scarcely pretend to follow closely such an intricate statement; but the general impression left upon the mind must be exceedingly satisfactory. In the first place the Committee had evidently taken very great pains, and had arrived at experimental results which must be considered of very great value; and secondly, he hoped Mr. Ransome, M. Coignet, and any others interested, would not be led into the idea that it was necessary for them to defend their pretentions against the deductions of the Committee. (Hear, hear.) It would be seen that the experiments went no further than the one question of the test of strength under pressure; and he ventured to think that there was no necessity for any defence of any particular material against these results, because with the exception of place bricks, and other such accidentally imperfect specimens, there was no doubt that the mere strength of these materials was quite equal to all ordinary constructive demands. But there was one other question upon which he thought the Committee might still be requested to pursue its investigations—a question, in point of fact, which he thought, when they came to reflect upon it, they would see was even more important than the question of strength. This last, in fact, he considered to be decided in favour of all the materials. But if they were to be used in building in London, the more important question was as to their durability when exposd to the London air. As far as he could remember, that was the point to which he had directed particular attention in his own paper, already referred to. Subject to the correction of chemists, he would suggest the testing of the substances for this purpose, by means of diluted sulphuric acid, or some other similar application, which might be thought, upon investigation and consideration, to be better; and he thought that during the Recess it might be well if some gentlemen, who were interested in the subject, would take this trouble, because the interest which they, as architects, felt in artificial stone—at any rate, in London—was not so much as to the production of a material which should supplant brick for constructive purposes (for good brick-work was all that could be desired for walling), but as to the production of a material which should supply the place of natural stone for decorative facing. As regarded Mr. Ransome, he was now, after all these experiments, precisely in the same position as before; they were not yet informed how far his material would resist the action of the atmosphere, and that was the point upon which information was chiefly desired. As for the stone of M. Coignet, it was apparently an engineer's material, and not one for the use of architects. It was a material to be made in large masses, and deposited for heavy and strong walls; and he had no doubt the results upon careful examination would bear out the opinion which he had formed superficially, that M. Coignet's stone was for engineering purposes exceedingly valuable; but for the decorative purposes of the architect it seemed to be valueless—at any rate, in the form in which it was presented now. But he recollected, by the bye, that last year M. Coignet exhibited decorations—in fact, some little sculptures—which seemed to be exceedingly good things in their way; he was sorry to see that they were not in the room now, and should like to hear more about them. Mr. Westmacott, also, whose patent he was glad to hear so favourably spoken of, might produce some surface blocks of his material (which was scientifically quite different from the others), and have that tested also. The same test might be applied to terra cotta, bricks, and natural stone; and he thought that in the course of a little time, a very valuable series of results would be derived from such experiments. The conclusion, however, at which he had individually arrived, was to prefer terra cotta to all these artificial stones. He fancied that in terra cotta they had the future material for improving the decorative effect of ordinary London building. There was, however, a gentleman present (Mr. Blashfield) who could speak for himself, as regarded terra cotta, as a manufacturer. That gentleman had given him such wonderful accounts of what he could accomplish with that material, that he was only surprised it was not used to the utmost extent. It seemed to him, from the description which Mr. Blashfield had given him of the manufacture of his material, that it was particularly adapted for London use; and if it could be produced, he would not say at a moderate expense, but at a very low expense—because what was wanted was something decidedly cheap—then the problem would be solved. He did not wish, however, for a moment to disparage Mr. Ransome's invention; he had the highest opinion scientifically of it; and he should like very much to have it ascertained that Mr. Ransome's material would efficiently and satisfactorily stand the atmospheric test. He would venture to move a vote of thanks to the Committee for their most laborious services to the Institute, and also a vote of thanks, more especially as regarded that evening, to Mr. Hansard, for the very lucid way in which, considering the nature of the subject, he had laid the results before them. He was sure that the meeting could not possibly pay too high a compliment to those gentlemen who had engaged in this investigation, for the very great time and care which they had bestowed upon it.

The Chairman suggested that they ought not now, perhaps, to go into the question of terra cotta, but confine themselves to the consideration of the Report.

Mr. G. R. **Burnell**, C. E., Visitor, would simply say with respect to M. Coignet's material that Professor Kerr appeared rather to have mistaken the object of the patent, which, in fact, was to make a cheap kind of concrete; and he might say that M. Coignet had recently executed a church in the neighbourhood of Paris entirely in that material, and in it he had produced all the mouldings of Gothic architecture, both externally and internally. With regard to terra cotta, he did not know whether that could be safely brought into competition with any thing that was used at present in the shape of bricks; for bricks were, in fact, a terra cotta.

Professor Kerr said he should like to ask Mr. **Burnell** whether the church to which he alluded was built by way of pisê or in blocks, Mr. Burnell having replied that it was by way of pisê, Mr. Kerr said that was quite a different thing from the blocks with which they had been dealing, and M. Coignet professed to make the material in blocks, and to use it as artificial stone.

Mr. **Burnell** said it could be used either way, and M. Coignet had lately executed some bridges of 140 feet span in this material.

Mr. C. H. **Smith**, Contributing Visitor, said there was nothing which would represent the action of the atmosphere; from a long experience he was prepared to say that with certainty.

Mr. J. W. **Papworth**, Fellow, observed that he might say that the subject had been carefully considered at one of the meetings of the Committee, and that without making a formal minute of their decision, they agreed that they could not rely upon any chemical or mechanical experiments on the matter in question sufficiently to insert in their report, if such experiments were made, such a paragraph as would appear to give information to the meeting.

Mr. **Boulnois**, Fellow, asked whether the Committee had considered it desirable to ascertain the absorption of the blocks at all.

Mr. **Hansard** replied that the Committee did enter into that question, with regard to M. Coignet's material; but it was not considered necessary with Mr. Ransome's, as Professor E. Frankland, F.R.S., had already done so, and whosé report had already been published in the Transactions of the Institute of last year. The samples of M. Coignet's that they tested were Nos. 3 and 4. At the end of the first week they were broken into two, and one-half was placed in water for two weeks. It then weighed six ounces, and it was then dried in an oven and weighed 5$\frac{3}{8}$ ounces, so that it absorbed five-eighths, or one-seventh of water.

Mr. **Ransome** said there had been some experiments carried out by Professor Frankland to ascertain the capability of the patent concrete stone to stand the action of the atmosphere, and a report had been published, and, he believed, had been brought before the Institute. The test was immersion in sulphuric acid, with subsequent boiling in water and brushing. The experiments were carried on at the same time, and under the same circumstances, with the various descriptions of natural stones, and a comparison drawn, when the total loss from all causes was found to be less in the Patent Concrete Stone than in any of the natural stones which were tested, excepting Park Spring.*

Mr. O. **Hansard** handed to the Chairman what he stated to be an interesting specimen of Mr. Ransome's stone, which until that evening had been in water ever since the day it was made, last May. It might interest some who liked to investigate the chemical action which had been going on. It had been previously carefully washed by Mr. Ransome to remove the sodium, and had, notwithstanding, deposited a considerable quantity of salt, and yet had much left in it. He did not consider that the period over which their investigations had extended had been long enough to arrive at any conclusion as to the weather-resisting power of the material.

Mr. **Morris**, Associate, said there was one artificial building in London, or rather a building where a substitute for bricks had been very extensively employed, and that was the Imperial Fire Office in Pall Mall, which was a large house, and was carried to a great height. That house had now been erected, he supposed, for some thirty years; and therefore as far as a mere substitute for brick was concerned, that question had been solved for a very long time, and he did not think that their attention needed to be directed to this point, when they were speaking of artificial stone. He thought that should the Committee extend their very valuable enquiries yet further, it would be desirable to explain the appearance of the substances they had tested, because when an architect was about to select a stone for ornamental purposes—and that was what they wanted artificial stone for—he had to look at it with regard to its suitable appearance for those objects; and therefore he thought that if the Committee were to express their opinion as to the general appearance and colour of the stone, it would add very much to the value of their report.

Mr. **Hayward**, (Hon. Sec.) in reply to the question put by Mr. Morris, said that with regard to the general appearance of most of the specimens of Mr. Ransome's material they were all that could be desired, and if it could only be manufactured so as to resist the influence of the London atmosphere he would certainly confer a very great benefit upon the building community. The only difficulty which they all felt, and which had arisen in the discussion so early in the evening, was this very point of durability. He (Mr. Hayward) could mention circumstances in connection with Mr. Ransome's stone —quite independent of any experiments which had been made by the Committee. In the very coldest part of the last winter he had made application to Mr. Ransome as to the use of a certain portion of his material for some balcony panels, and enquired especially as to the action of severe frost upon it. Mr. Ransome kindly sent him a specimen which had evidently been subjected to frost, having come up from Ipswich with a great mass of ice in it. This had been lying about in-doors and out ever since, exposed to all temperatures and weathers, and without any apparent damage. If the material had been incapable of bearing any ordinary amount of atmospheric influences it could not have stood this test in the severest part of the winter. From what he saw, therefore, of that specimen, (and he supposed it was an average specimen, for it was sent up from the works directly the question was raised,) he should have no hesitation himself in applying the material to the purpose for which he thought of using it at that time. He believed the great advantage of terra cotta was this, that there could be no doubt of its being perfectly capable of resisting all atmospheric influences when well made. The extent to which it had been used, and the length of time it had resisted all weathers and climates, made him feel perfectly safe in adopting it. As Professor Kerr had alluded to the subject, he might say that he had seen some of the "wonders" which Mr. Blashfield was doing with terra cotta, at his works at Stamford, and having investigated the matter himself, he could say, from personal observation, that before the material went into the ovens it was in such a hard, close, and compact condition that it was turned in a lathe, and so adapted to the most delicate forms which they could desire. Moreover, the specimen which he saw, after they were baked, held their forms as exactly and as purely as could possibly be done if they had been worked out of stone by hand. As far as he was able to judge then, he believed that the manufacture of terra cotta was brought at the present time to great perfection, and nobody need doubt that it could be introduced to an enormous extent, and it was really wonderful that it had not been so already. He only hoped that Mr. Ransome's material would turn out eventually to be as good as terra cotta, and he thought it would then soon find a place for itself, seeing that it was capable of being so very easily moulded and in such a short time prepared for use, and not being necessarily subjected to the peculiar influences of heat, which rendered terra cotta so liable to twist and get out of shape.

---

* Vide Copy of the Report, Trans. R.I.B.A., 1862-63, page 159.

Mr. J. W. PAPWORTH felt that it would be very desirable for members to understand that with regard to terra cotta durability was simply a question of excellence in manufacture. In 1827 some of the finest terra cotta of that time was exposed; in 1837 he placed by its side a piece made by another manufacturer; in 1847 they were accompanied by a third piece made by another firm; and in 1849 all three had perished: that which was made in 1827 had not gone so badly as the others; that made in 1837 was pretty much in the condition of the boiled flints now exhibited; and that made in 1837 was literally mud. The reputation of the manufacturer was the only guarantee which they could have for the excellence of the material. With regard to the question of the atmosphere he would only say, that from his own experience and from the lessons which he had been taught in early life, he believed it was impossible to judge whether a factitious material would or would not stand the atmosphere, until it had been exposed for several years.

Mr. AITCHISON, Fellow, wished to say a few words on this subject. The experiments which had been made were very interesting, but he did not believe that they went far enough. As far as artificial stone was concerned he supposed there were very few architects who were interested in knowing the exact weight which it would bear when used for the mere purpose of decoration, but as far as these materials were used for foundations it was a very important subject indeed. Where a great weight had to be borne they frequently had to carry up foundations from a very great depth, and it was of very great importance to meet with some material that could be used at a comparatively low cost. The experiments which had been made on these small cubes, of course, gave no idea of how the materials could be applied in large masses in foundations for piers or columns, but it would be a most important thing if they could know that there was a material, at an expense very little more than concrete, which would answer the purpose. Professor Kerr said, materials generally were strong enough for the purposes to which they were adapted, and especially bricks, unless they were place bricks; that might be so generally in houses, or in buildings of small size, but it was not at all so in large buildings, more especially if such buildings were intended to carry heavy weights. One question which he had not heard raised was, whether the material was fire proof. Cements, as they knew, were not fire proof, mortar and plaster of Paris excepted. In all the large warehouses which had lately been burned the fire had hardly touched the mortar, or only to the extent of about three-quarters of an inch, and in no case had the brick work been seriously injured by the effects of fire, except where, from the swelling of large masses, it had cracked, but where cement was used it flew to pieces like red hot glass when dipped into water; in some instances to which his attention had been particularly called, the heat had been so intense that the bricks had been vitrified, and had run down like icicles, and there the mortar was uninjured, except in portions, and the walls were used again for the new building. It very frequently happened that in buildings for storing inflammable goods it became of very great importance to be able to use some fire proof material. So little was known about wrought iron at the present time, that it was impossible to say whether supports might be made of it which would stand when they were made red or white hot. They knew that brick piers would answer the purpose, but there were some cases in which they could not be used on account of the large space they occupied. He knew warehouses with six floors, in which a bay on each floor was loaded with twenty tons, or one hundred and twenty tons on the lower supports, and taking the experiments which had been made on brickwork in cement, he found that one square foot of brickwork would be crushed with about twenty-eight tons weight, which nearly agreed with the experiments made on the subject before the fixing of the Britannia Tube, and taking that experiment, with the statement that the working load was only one-tenth of the crushing load, he found that to support the requisite weight in the warehouse which he had mentioned they would require a pier six feet by seven, or forty-two feet more than one-fifth of the area of the whole bay of two hundred feet, which was so large a space that it really became a very important question. In the houses which had lately fallen down at Hackney, there was a great weight put upon a small bearing, which pinched the bricks, and the whole thing gave way. It was well known that the Romans made nearly all their buildings of concrete, either facing them with stone, brick, or terra cotta, and he believed there had been several patents taken out for building houses with concrete, and then facing them with slabs of terra cotta. The question, therefore, was not whether buildings could be formed of artificial stone, but whether it could be used advantageously in point of space and cost. If they tried the strength of these materials at all, the main thing which they wanted to know was how they could use them for foundations. As far as other materials went he had suggested, but unfortunately he was too late, that some experiments should be made with bricks and mortar at certain dates after they were first set, for when buildings were first put up they were frequently loaded before the mortar had time to set, and in all cases the green brickwork had to bear the weight of the superstructure, and if fire had to be guarded against they could not be built with cement. It was a pity that some of the experiments had not been carried a little farther, so as to see how the usually admitted formula for the strength of columns could be applied both to wood and stone. There was a certain artificial stone which had been used, and which he believed, at any rate had answered the purpose of utility if not of beauty. It was called Granitic Breccia; but he did not know whether it was still manufactured; it was made with broken Portland stone and Portland cement subjected to pressure, and covered over with silicate of soda. He had used it, and seen it used in several places, principally as paving, and he believed it answered the purpose most thoroughly.

Mr. JENNINGS, Fellow, said that as no one had actually seconded the vote of thanks he rose to do so. He should not venture to make many observations upon the subject before them, because there were many others present who were much better acquainted with it than he was, but as regarded the question of colour, he thought that was a matter of considerable importance, because, looking at the specimens on the table, the colour was certainly not very satisfactory. With regard to determining the question of how long the stone would stand, he thought that what had been referred to by the Secretary was important, and that in addition to the sulphuric acid test, they should try the effect of frost, and of a rapid thaw, which appeared to be one of the greatest tests which they could apply to stone, and he imagined it would be the same with artificial stone. He did not know whether the Committee had taken into their consideration at all a French patent which existed for making stones of slate dust. He believed it was made under pressure with some mixture of asphalte or pitch. There was certainly one objection to it, that it was black, and therefore its colour would render it fit only for some purposes, but he was rather curious to know what the result of that patent had been.

Mr. BURNELL said he saw the church which he had spoken of, which was being built by M. Coignet, near Paris, on the fourth of January in this year. The works had then been proceeding during the very hard frost which set in in Paris on the first of January, but no effect whatever had at that time been produced on the stone.

Mr. C. H. SMITH, Hon. Member, rose, thinking it but justice to the various inventors collectively, to say a few words with reference to the accuracy with which their artificial stone may be moulded to the required dimensions, particularly that produced by Mr. Ransome's process. He would remark upon it in comparison with terra cotta, of which so much has been said. Terra cotta was obliged to be moulded so much larger than it was intended to be when finished, in order to allow for shrinking, which it did surprisingly after having passed through the fire or furnace; in some cases the shrinkage amounted to twenty-five per cent. or three inches in a foot; this would not be of so much consequence if the material shrunk uniformly, but as some parts were mixed with a greater quantity of water than others, an irregular shrinkage occurred in drying, sometimes to the extent of two inches, sometimes three inches to the foot. This defect was particularly brought under his notice some years ago, when engaged upon the ornamental carving at Dorchester House, Park Lane, the Corinthian capitals in the hall and staircase were proposed to be of terra cotta (or china, which is somewhat similar). He suggested what was afterwards carried out, viz., that the bell of the capital should be formed of marble, and the ornament prepared in terra cotta, china, or porcelain ware, to represent white marble, to be fixed upon that. He recollected one Sunday morning, some thirty years ago, in the middle of service, the congregation at St. Pancras church were alarmed by a tremendous crash over their heads, a portion of the triangular ornament at the top of the spire, something like the crowning feature of the Choragic monument to Lysicrates, at Athens, fell through the leaded roof and rested upon the rafters of the ceiling; it shook some of the plaster down, but fortunately nothing else came into the body of the church. The terra cotta maker who prepared the work knew he was putting up defective material; he knew that it was cracked, and put the cracked part behind! He (Mr. Smith) had been frequently told, as a proof of the extreme durability of terra cotta, to look at the specimens in the British Museum, of the Augustine age, but he had never been told how many bad specimens had perished; they were all gone; the good ones only remained. He could point out several examples in London of decayed terra cotta. With respect to the cost of mouldings in terra cotta, or in any artificial stone, he did not believe they could be produced at the price for which they might be done in Portland stone; he had carved many thousand feet of enriched moulding at the Royal Exchange, not exceeding twelve inches in girth, for three shillings a foot run, which gave him a fair profit, while similar mouldings in artificial stone, at St. Pancras church, cost eight shillings and sixpence per foot run.

Mr. Alfred White, Visitor, said he had but a very few remarks to offer. It was a great pleasure to him to be called upon by the Committee to assist them in any chemical matters which might arise; but, really, so few features of that sort had presented themselves, that he was afraid the remarks he had to make would not be very valuable. He would, however, say a word or two as to the durability of these artificial stones. This was an extremely difficult subject, and one upon which a conclusion could not be arrived at so easily as some gentlemen present might suppose. He believed that it was partly his fault that the Report had not been presented before, and it was more especially delayed to endeavour to ascertain something during the frosts of the last winter with regard to the durability of these stones. Great care was taken, and great facilities were given to the Committee by Mr. Dines; but one winter, (and if they came to reflect they would not be astonished at it,) was not sufficient to come to any important conclusion as to the durability of stone. You must remember that many stones which had failed after a few years, had stood a winter or two extremely well; in fact, very little impression would be made by the frosts of one or two winters. These delays had certainly given the Committee an opportunity of trying some more experiments, but they had not led to any very important result as to the durability of stone. With respect to any particular solution or test which they could apply, diluted sulphuric acid would very likely test the durability of some stones, but he could see very clearly that many descriptions of stone which would be extremely durable, would not pass well through the test of sulphuric acid. For instance, a class of limestones which were extremely useful, and which were certainly very durable, (he meant the kind of stone of which Salisbury Cathedral was composed, and which existed to a very large extent in that district,) he believed would utterly fail under the test of sulphuric acid; and for this reason, that the durability of that stone depended partly on its containing a small proportion, (varying from five to fifteen per cent.) of sand, or silica. If they applied diluted sulphuric acid to that kind of stone, they would dissolve away the carbonate of lime, and leave the silica which protected the stone so beautifully from the atmosphere, unsupported, and it would fall down as sand. He did not think they could apply it to natural stone, and it certainly would not be fair to apply it to artificial stone. Sulphuric acid would act very differently on M. Coignet's and Mr. Ransome's compositions, and they would really gain no information by the application of such a test. It was a subject to which he had paid much attention since he had acted with the Committee, and was convinced that nothing but exposure for a series of years would give any valuable information as to the durability of stone. He should like to make a remark or two about Mr. Ransome's stone. It appeared to him that if properly prepared it would be a stone which would stand the atmosphere of almost any city or any place. He could not see how that stone was to be destroyed if prepared perfectly. He thought Mr. Ransome had not yet made his process perfect, but had many experiments to make. He was convinced that the strength of the solutions used in the preparation of the stone was a matter of the very greatest importance. He believed, from what he had seen of the specimens prepared for the Committee, that many of the failures had arisen from one or both of the solutions being made too strong. The stone must be so prepared that the chloride of calcium would penetrate to the centre of the block uniformly, and he was sure Mr. Ransome would admit that up to the present time he had not arrived at that state of perfection. He thought it would be extremely important if they would allow many of these specimens to be exposed for a year or two under the eye of the Institute. If these were examined from time to time, they would afford much valuable information. Architects must be very cautious how they employ artificial stone, and expose it to the atmosphere, and more especially in London. It will require a considerable number of experiments, and a great amount of experience, before they can arrive at anything like certain conclusions. With regard to the remarks which had been made about terra cotta, that was not a subject which came under the notice of the Committee, and therefore they paid no attention to it, but he could very well understand that terra cotta would vary extremely according to its composition, and the mode in which it was burned or baked. It came, when properly made, so near to perfect brick, that it appeared almost impossible for it to fail. Of course it was much more easy to ascertain the durability of a natural material than an artificial one. The natural material was exposed in quarries, and in sections, and that gave them an opportunity of observing the effect of exposure to the atmosphere, whereas time only would allow them to come to anything like a sound conclusion as to artificial stone.

Mr. Blashfield, Contributing Visitor, said that this was a subject which had interested him very much, and perhaps he might be allowed to say a few words upon it. It was one which had often engaged his attention in former years, especially in connection with concretes and cements. There was a house, he believed, in Park Street, which the late Marquis of Normandy lived in, and which was built of concrete blocks, formed of shingle, sand and Mulgrave cement, and designed by the late Mr. Atkinson The blocks had great sharpness, and there was really but very little the matter with the house. He always looked at it whenever he passed, and he regarded it as being the best specimen of that sort of work in London. It was suggested to him that he should make some of those blocks, and he set to work, and had some made out of an iron mould. The mould was two feet by two feet, and by putting in some iron plates he got ten or twelve different forms from the same mould. He tried several compositions, and in the first place used Roman cement, broken tiles, and coarse sand, but he found that was rather costly. He then took ballast and broken bricks from the brick-field, and certainly this was stronger and less costly. He mixed very hard broken bricks, or burrs reduced to a small size, about half an inch, with Roman cement and sand. He forgot now the exact measure, for he was speaking of work which was done five and twenty years ago. This composition was strong. Those experiments led him to apply to Mr. Petty, of Leghorn, for some Italian pozzolana, which he used with lime and sand, and with sand and Roman cement, and the concrete blocks so made became very hard. The blocks made of Roman cement, pozzolana, lime and sand were soon ready for use. Those made of lime, sand, and pozzolana were longer setting, but eventually became the strongest. To these combinations of Roman cement, sand and pozzolana, and lime, sand and pozzolana, he added pot-sherds such as Pliny relates the Romans mixed with their mortar, and he considered that increased toughness was obtained by this addition. He had a house built of blocks made of pot-sherds, sand, and Roman cement, at Northfleet, and Mr. Bevan, the banker, had four small alms-houses built in the same way with this same concrete. The trouble was very great in fitting the door-ways and sash-frames, and other matters; and in making the courses he took the trouble of having a drawing for each course, so that all the blocks were very carefully arranged for bonding. Altogether the matter was so troublesome, that upon going into it with an architect, he found that it would be much dearer than building in the ordinary way. He had one of the pozzolana concrete blocks kept under water for two years, and its hardness was very great. The late Mr. Walker, the engineer, showed him specimens of Dutch terras, which had been used in the Woolwich dockyard in the reign of George the Third, and which were of very great hardness—in fact, he was told that in breaking up the dock where it was used, the workmen were obliged to have resort to gunpowder. Messrs. Walker and Burgess were employed on the embankment in front of the New Houses of Parliament, with whom he had a long conversation on the subject of pozzolana. Mr. Walker used pozzolana, lime, and sand for the concrete and mortar in that work, and he knew it to be a most excellent material, and from enquiries which he had made, he believed this mortar cost about £1. a ton. Two measures of sand, one of pozzolana, and one of lime, were considered good proportions to make a very excellent concrete. Mr. Lee used a very fine concrete made of Portland cement, Portland stone chippings, sand, and shingle, in great blocks, 16 feet and more cube, made in moulds, for the breakwater at Dover. He made some experiments for this work with the Lancashire terras, mixed with broken tiles and sand; but it was not deemed equal in hardness to the Portland cement concrete blocks, and it was abandoned, though Sir John Rennie gave it some very fair tests in some of his works. With regard to the manufacture of terra cotta, he could not say that he was a very old manufacturer, for he had only begun it about the year 1851. He had had the acquaintance of the late Mr. Herbert Minton for some years before that, and when that gentleman began making buttons, he suggested to him the idea of making tesserae for pavements, which he had tried to make from marble and other substances. The knowledge of pottery he obtained through Mr. Minton's experiments upon pavements, and other works, showed him that what was called "terra cotta" was an imperfect thing for the atmosphere of London, and that terra cotta, as generally used, was nothing more than baked clay with a little sand, and a few broken potsherds, and that to make a hard material like Mr. Minton's tiles, it was necessary to use other matters. He had tried to make something of that kind, and had at the commencement made after great labour and expenditure, some of the mistakes which Mr. Smith had described. He had sometimes made things two inches longer than others, with the same quantity of water, clay, and sand, and burnt in the same kiln, and it was only in experiments carried on during several years, that he had been able to arrive at any approximation to perfection. Since Christmas he had made at least 4,000 balusters from patterns, and about 400 keystones of different sizes, and he would venture to say that these had not varied a quarter of an inch. Part of these works had been executed for a very large public building, and an architect had visited the works and given a certificate for every payment which he had received, after a careful inspection of the terra cotta. He did not say that everything was perfect, but on a very large work, comprising some 10,000 pieces, his loss had not been five per cent.

Mr. T. **Hayter Lewis**, Fellow, was most anxious that the meeting should not separate without giving the due meed of honour to Mr. Dines, Mr. White, Mr. Burnell, and Mr. Papworth for the very great kindness and attention which they had shown throughout the whole course of the experiments. Mr. Hansard's name had been brought forward by Professor Kerr in his original motion, and therefore he (Mr. Lewis) could not include him. Nevertheless, he was bound to say that Mr. Hansard had been most unwearied in his attention to the subject, and had devoted a vast amount of time to it, and the Institute would be wanting in gratitude and respect both to him and to the other gentlemen whom he had named, and to themselves, if they omitted to vote the resolution which he had proposed. At that late period of the meeting he would say no more as to the result of the experiments than to call the attention of the meeting to the results of the crushing of the cylinders of stone and marble then exhibited. It would be seen that the whole of them had crushed in the direction of the length, whichever way was the direction of the bed; and these results agreed very strikingly with the results of the experiments which had been made by Mr. Hodgkinson on the breaking of iron columns, and which had been published some few years ago in the "Transactions of the Society of Civil Engineers." When iron was first brought into use, they used to have the most horrible forms of columns possible, swelled out in the centre in a sort of fish-bellied form, because it was considered that columns would break by bending, and that they needed, therefore, to be strengthened in the middle. Within very narrow limits this might possibly be the case, but not with the size of which columns were usually made; and as nothing more horrible could scarcely be conceived than the above form, it was satisfactory to find from Mr. Hodgkinson's experiments that it was not the best for strength. The experiments now reported on by the Committee proved this also in a very striking way. It was a most important point, and clearly proved that the old form of cylinders were practically the strongest as well as the most graceful. He would now propose a vote of thanks to the gentlemen whom he had mentioned.

ON CERTAIN EARLY ROMANESQUE BUILDINGS IN SWITZERLAND AND THE NEIGHBOURING COUNTRIES.

By EDWARD A. FREEMAN, Hon. Member.

Read at the Ordinary General Meeting of the Royal Institute of British Architects, June 13th, 1864.

MY object in the present paper, as in a lecture on a kindred subject which I gave last year before the Architectural and Historical Society at Oxford, is rather to stimulate curiosity than to gratify it. I find myself on the edge of a very large subject, of which I have advanced very little beyond the edge. It is by no means likely that I shall myself ever go very much further; but I flatter myself that various circumstances have put it in my power to give some useful hints to those who may be inclined to follow up the subject more minutely. This is what I attempted to do last year at Oxford with regard to the architecture of Switzerland generally. I recommended it as a branch of architectural study which presented much that was attractive in many ways, but which had hitherto been almost wholly neglected. I pointed out the only way in which the subject could be successfully studied, and I started several questions as having occurred to me which I by no means pretended to answer myself. I believe that this is the best service which can be done by one who opens what is practically a new subject. It is dangerous to dogmatize on a first sight of anything; but to an observer who has his eyes open the first sight of anything is sure to suggest subjects of inquiry, which, whatever may be the results finally reached, cannot fail to be useful both to himself and to others. What I did last year at Oxford with regard to the general subject of the ancient architecture of the countries forming the present Swiss Confederation, I propose to do now with regard to one particular branch of it which specially attracted me on a second visit this year. This is the early Romanesque architecture of Switzerland, looked at as a contribution to the general study of comparative architecture. I propose to mention several buildings which greatly struck me, but I do not profess to give a minute antiquarian account of any one of them. I propose to point out several lines of inquiry which they suggest, but I have to confess that, so far from having myself exhausted them, I have hardly entered upon any of them. I shall venture to mention a general conclusion to which such facts as I have observed seem to me to point; but I shall put it forth only as an idea floating in my own mind, ready to be confirmed or refuted by future inquiries, by no means as a decided conclusion which I am anxious to thrust down the throats of others, or even as one which I am prepared dogmatically to defend.

The idea—for I can hardly venture to call it a conviction—which is thus suggested to me by what I have seen in several parts of Western Europe amounts to this. It strikes me that, before the later forms of Romanesque with which most of us are familiar, the Norman of England and Northern France, the peculiar Romanesque of Germany, the peculiar Romanesque of Aquitaine, and any other national or local varieties which any other observer may wish to establish, there was an earlier form of Romanesque spread generally over Western Europe, more directly imitated from Italian models, and differing less widely in different countries, than the varieties of Romanesque which followed it. It strikes me further, that in the course of the eleventh and twelfth centuries, this common style was generally supplanted by local styles which each country developed for itself. Again, it would seem that this common style survived longer and attained a higher development in some countries than in others; that in some countries the later Romanesque of the district was developed out of it, while in others a later form of Romanesque violently supplanted it. It would follow then that in some countries we may expect to find buildings of this sort of some size and pretension, while in others we are driven to patch up our notices of the early style from small and rude fragments here and there. A large and highly-finished building of the twelfth century in one country may be the true congener, not of its contemporary large and highly-finished building elsewhere, but of some obscure little building in some out-of-the-way corner, which nothing but its poverty and obscurity has preserved from destruction.

This is then the view which I have been inclined to all along, and which what I have seen in Switzerland has gone far to strengthen, but I throw it out only as something to be tested or sifted either by myself or by anybody else. I would strongly recommend it as a subject to be fully worked out by some of those who have more time for such inquiries than I, that is, by some of those in whose historical researches architecture holds the first place. With me, I need hardly say, architecture is but a secondary pursuit, something more indeed than a mere amusement, but still a study quite subordinate to others. Above all, in Switzerland, where the political problems of the present and the past necessarily absorb almost every thought, where the present has grown out of the past instead of being substituted for it, where the life of old Greece, of mediæval Europe, and of our own times, all live together in such strange and wonderful harmony, it is only a very secondary care that the historical inquirer can afford to give to the architectural monuments of the country. In the land of bondage one turns to the contemplation of the ancient glories of Toulouse or Alby as a pleasing relief from the dreariness of the present; in the land of freedom one can hardly find time to examine a castle or a minster when one has a chance of beholding a Landesgemeinde. But I must give an emphatic warning to any one whom I may induce to enter on the subject. The study of architecture and the study of political history must go hand in hand. The student may determine at pleasure which he will make primary and which secondary, but if he wishes to understand either worthily, he must not be wholly ignorant of the other. A man who is wholly ignorant of history may doubtless both put together a building, and put together æsthetical theories about it, but he can know nothing of the real history of his art unless he studies it in connexion with other branches of history. Again, I do not hesitate to say that the man who studies general history without paying any regard to the history of architecture leaves out one important portion of his subject. The architecture of a country is as much a part of the national life of a people, and is therefore as much entitled to a place in its history, as its laws, its language, its military discipline, or its social habits. I do not say that all of these branches are of equal importance, but I do say that each of them is of some importance, and that he who leaves out any one of them, be it architecture or any other, leaves out an essential part of what he professes to learn. And I must repeat, what I have often said before in other forms, and what is of especial moment in everything which concerns the history of Switzerland, that he who would make himself master of architectural history, or of political history, or of any other branch of history, must, first of all, thoroughly emancipate himself from all bondage to the modern map. In studying any building or class of buildings, he must remember what were the political divisions of Europe at the time when those buildings were erected. It would be invidious to mention here the ludicrous blunders into which even really distinguished men have fallen through neglect of this caution. We must remember that mediæval architecture knows nothing of a France that touches the Rhine, that Romanesque architecture knows nothing of a France that touches the Alps or the Pyrenees. From forgetting this, when people find the national architecture of Germany, Burgundy, and Aquitaine within the limits of modern France, they either set it down as French, or else wonder at finding within France architecture which their own eyes tell them is not French. They forget that the lands of which I speak are French in no sense except in that of having been seized by France for the most part long after their principal buildings were built. Thus in Aquitaine, the Romanesque buildings are all purely national; in the Gothic period we find national and

French buildings side by side. So, when I speak of Switzerland in the heading of this paper, I use the word only for geographical convenience. In Romanesque times, and long afterwards, no such country or nation as Switzerland existed. The present Swiss Confederation consists of certain portions of the three kingdoms of Germany, Burgundy, and Italy, which have gradually joined themselves together at various times from the fourteenth century to the nineteenth. The Swiss nation is an artificial nation, a product of comparatively modern political circumstances. It is none the less truly or honourably a nation for being thus artificially formed; but this artificial and modern origin completely cuts Switzerland, as Switzerland, out of the architectural map. In the days of which we speak the Swiss name had not spread beyond a very small district of the Duchy of Swabia. There is therefore no such thing as Swiss architecture as far as we are concerned; the architecture with which we have to do is German, Burgundian, and Italian. It is then to the ancient Romanesque architecture of the border lands of the German, Burgundian, and Italian kingdoms that I would now call your attention, and to the light which that architecture throws on the probable existence of an early form of Romanesque common to Western Europe in general.

Of this question I may remark, in passing, that the questions which have been raised in our own country as to Norman, and what is called "Anglo-Saxon architecture," form a part. To the name "Anglo-Saxon" I have no sort of objection, if people only understand what they mean by it. I only quarrel with it as a purely chronological term. Some people by "Anglo-Saxon" simply mean "before 1066," and by "Norman" "after 1066." In this sense the name is of course absurd. But if what is meant is that there was in England an independent variety of the great Romanesque family, which grew up long before the Norman Conquest, and which was gradually supplanted by the Norman style, so that the earlier "Norman" and the later "Anglo-Saxon" buildings are contemporary, then the only objection to the name is that the word "Anglo-Saxon" is often used in such a foolish and confusing way that it is very likely to be misunderstood. I believe that there was such a style, a strictly native offshoot from the old Italian models, which gradually died out before the Norman in the course of the last half of the eleventh century, and which is now represented only by a few fragments here and there, some of them older than the year 1066, and some of them later. My present object is to show the probability that this native English style was only one branch of a more widely spread form of early Romanesque, which, both in England and elsewhere, gave way to later local forms, but which in some countries lasted longer and attained a higher development than is shown in any existing English example.

I have said that the question of the existence of an independent ante-Norman style in England, forms part of the greater question suggested by the German and Burgundian buildings which I would introduce to your notice this evening. But let me remark that one or two controversies which have sometimes been mixed up with the question of the existence of such a primitive style have really nothing to do with either. For instance, the question as to the date of Waltham Abbey has nothing to do with our subject. That controversy was confused by one or two people who chose to drag into it the misleading word "Saxon." But, as Waltham, whatever its date, is undoubtedly Norman in style, the two questions should have been kept quite distinct. I have seen no argument yet brought strong enough to overthrow the historical presumption that a large part of the present church of Waltham is the original work of King Harold. But any opinion on this matter either way does not directly affect our present subject. It may affect it indirectly, because, if Waltham be really work of the eleventh century, then the art of the eleventh century could not have been so rude as is sometimes taken for granted. But it has nothing directly to do with the question of style, because Waltham is pure Norman in style, and has nothing to do with the primitive buildings of which I am speaking. The only difficulty is that some people cannot understand the possibility of a "Norman" building before 1066, or of a

"Saxon" building after 1066. Yet we know from history that the style in which Edward the Confessor built Westminster Abbey was remarked as a new style,* and if Waltham, or any part of it, is really Harold's work, the great Earl did but imitate or forestall his sovereign in introducing the last improvements in art from a neighbouring country. On the other hand, there is historical evidence to show that some buildings in the "Anglo-Saxon" style, if we are so to call it, are later than the Norman Conquest. There is nothing wonderful in this; it is the common course of all transitions. The two styles exist for a while side by side; the earliest buildings in the new style are older than the latest buildings in the old style. The Norman nave of Peterborough is later than the advanced Transition of Canterbury, and than St. Hugh's Early Gothic at Lincoln. The same thing always happens in such cases; still more would it happen when the new style was introduced from without, mainly under the patronage of foreign conquerors. Small buildings in obscure places, the work of native founders and native builders, would continue to be built in the old national fashion, long after every cathedral and abbey and castle was built in the newly imported foreign style. There is then no difficulty in the erection of a Norman building in England before 1066, and, if we are to talk of "Anglo-Saxon" buildings at all, there is no difficulty in the erection of an "Anglo-Saxon" building after 1066. It is only the unlucky use of ethnological words as if they were chronological, which has led to any confusion about the matter.

I believe then that our primitive English or "Anglo-Saxon" style was an independent variety of Romanesque, which, in the course of the latter half of the eleventh century, gradually died out before the newly-imported Norman. I wish now to show the connexion between this primitive English Romanesque and the primitive Romanesque styles of other countries. Now we have a great disadvantage in England from the fact that no large building in the primitive style is preserved. We have to pick up our notions of it from small, and for the most part fragmentary, examples. It was in fact, as I believe, the small size of the native churches, rather than any actual inferiority in art, which made the Norman builders despise, destroy, and rebuild, every important church in England. The building of churches on an enormous scale, like Winchester, St. Albans, old St. Pauls, was a great fancy among the Norman builders of the eleventh century. It is a fact worth noticing that it is a custom which never spread into either Wales, Scotland, or Ireland. The strictly native churches in all those countries are all very small, and even those which were built under Norman or English influence never attain the size of the huge Norman minsters of which I speak. St. Davids, Glasgow, St. Patricks, are all churches, not of the first, but of the second order. At Cashel, the thirteenth century Cathedral is really very small; but it seems vast beside the original Irish Cathedral of the twelfth, which has now become a mere adjunct to it, and goes by the name of Cormacs Chapel. I wish specially to insist on this difference in size, because during the Romanesque times, size and richness seem to have gone in an inverse ratio to one another. The smallest buildings are commonly the richest; the largest are everywhere the plainest. Undoubtedly many small Romanesque churches are very plain, but it is not too much to say that no very large Romanesque churches are very rich. The examples of the most elaborate Romanesque ornament come mainly from very small churches, hardly ever from churches above the middle size. A small Romanesque cathedral is richer than a large one, and a parish church, if it pretends to elaborate architecture at all, is still richer than the small cathedral. This is not a mere question of date; the late Norman of Peterborough differs much from the early Norman of Winchester, but it is not a bit more richly ornamented. It is in fact a peculiarity inherent in the style; the larger a Romanesque building is, the better it can dispense with ornament. A church as big as St. Albans and as rich as Iffley would be intolerable.

---

* One need hardly quote over again the familiar passages from William of Malmesbury and Matthew Paris.

I suspect then that it was the small size of the primitive English churches which, more than anything else, led to their almost complete destruction at the hands of the architects of the next period. In amount of ornament I know of no reason to suppose that they were inferior to their successors, though that ornament may well have been of a much ruder character. Indeed, the small remains which we still possess of our Old-English churches, together with the contemporary descriptions of larger buildings, seem to point to a certain barbaric richness as rather a characteristic of the style, in opposition to the usual plainness of the early Norman. Such a tower as Earls Barton, such a church as Bradford-on-Avon, evidently affected no small degree of enrichment according to the taste of the times. But on the other hand, no doubt many buildings were built in a very plain style then as well as at other times. But we must carefully guard against the notion that sculpture, all such sculpture as requires the chisel, was unknown till late in the twelfth century. This idea is grounded solely on a misconception of a passage in Gervase,* who simply says that, in Conrad's choir at Canterbury, the chisel was not used on the piers and arches. Of course it was not; the capitals of massive Norman piers, and the surface mouldings of early Norman arches, seldom needed it; but that in no way proves that the chisel was not familiarly in use long before the time of William of Sens. And we must equally guard against another notion, that all or most of our early churches were built of wood. No doubt churches and other buildings were sometimes built of wood at all times; no doubt in early times the practice was more common than afterwards; it is even probable that some features of the primitive Romanesque style, as it appeared in England, were actually borrowed from imitation of wooden structures; but all this in no way proves that timber was the one universal, or even general, material in use before the Norman conquest. As a general rule, material depends rather upon place than upon time. Where good stone was to be had, churches, and even houses, would be built of stone for whole centuries during which wood was used in less favoured districts. The wooden theory is right in the teeth of the numerous contemporary descriptions of early stone churches, and the evidence brought in support of it commonly tends, when examined, to refute the theory. When King Cnut dates a charter—if the charter be genuine—from "the wooden church at Glastonbury," † the description proves one of two things: either there was a stone church as well, from which the wooden church needed to be distinguished, or else a wooden church struck the King or his chaplain as something so remarkable that they thought it necessary to distinguish it by an epithet expressive of its singularity.

I am thus gradually clearing the path by which I reach my main subject, the light thrown by certain Swabian and Burgundian buildings—I use the geographical language of the age in which they were built—upon the general question of a primitive Romanesque style. Almost our last step will be briefly to sum up the characteristics of that primitive style, as far as we can ascertain them from the few and rude examples left in England, in order to see how far they agree with the more finished structures of the same class to be found in foreign countries. Every one who has at all studied these controversies knows well the sort of details which are commonly appealed to as signs of "Anglo-Saxon" style or date—the mid-wall shafts, the baluster-shafts, the double splay, the lack of buttresses, the triangular-headed openings, the pilaster-strips perpendicular and horizontal. We may perhaps add some odd forms of mouldings—if they deserve the name—such as may be seen in some of the chancel and tower-arches of the style, and some rude pillars, very unlike Norman, and clearly clumsy imitations of Roman work, such as may be seen at Repton.* The character of the piers may be less certain; probably both the massive square pier and the no less massive round pier were in use. The massive round pier is so distinctive of the Norman of England as compared with that of Normandy, and it is found in English Norman of so early a date, that it is difficult to believe that it is not a national peculiarity of earlier times, which the Norman builders simply continued. But the square pier was also in use, especially when Roman remains were made available. We see this at Brixworth; we see it also at St. Albans, for St. Albans, intensely Norman as it is in its vast size, must, in some points of detail, be looked on as an example of the ante-Norman style. It is said that the design of rebuilding the church was entertained before the Conquest, that more than one Abbot made large accumulations of materials for the purpose; † it is clear also that in some points St. Albans forsakes the ordinary Norman type, and approaches to the buildings of earlier times. The natural inference that what Paul and his successors did was to carry out, on the vaster scale which suited their Norman ideas, the plans of their English predecessors. The square piers at St. Albans, as at Brixworth, were the necessary result of the use of Roman materials. Probably both forms, and indeed the columnar pier also, were used as taste or convenience dictated.

---

* The words of Gervase (X Scriptt. 1302) are "Ibi [in the old choir] arcus et cætera omnia plana, utpote sculpta secure et non scisello, hic [in the new choir] in omnibus fere sculptura idonea." He is speaking of the piers and arches only, and he does not at all imply that the chisel was a new invention.

† See Kemble, Codex Dipl. iv. 41. "Promulgata in ligneâ basilicâ." The charter is marked by Kemble as doubtful, but the "lignea basilica" is one of those incidental local points for which a forged charter is as good evidence as a genuine one.

But, after all, as every one familiar with these early buildings knows, the thing which really distinguishes them from their successors is the peculiar type of tower employed. Every one knows the type of the "Anglo-Saxon" tower; leaving all technical details aside, how utterly different it is from the Norman tower in its whole feeling and character. The Norman tower, low, massive, never so much in place as in the middle of a church; the "Anglo-Saxon," tall, hard, square, unrelieved even by the shallow Norman buttress, suited only for a position, like the west end, which displays its full height. Years ago, when I wrote my "History of Architecture," I pointed out what I believed then, and what I believe still, to be the origin of the difference.‡ The Norman tower, never thoroughly at home but in the centre, is the direct successor of the dome. A careful study of Aquitanian, French, and German churches will easily show how the square central tower was gradually developed out of the earlier cupola. The true Norman tower, just like the cupola, is not a campanile, but essentially a lantern to the interior. But the "Anglo-Saxon" tower is essentially a bell-tower; it is the lawful offspring of the old Italian campanile, whose general character it reproduces in a rude shape. The height, the squareness, the peculiar character of the windows, all come from that source. Again, besides this manifest derivation from Italy, the analogy between our old English towers and many of those in Rhenish Germany has often been remarked. More than one architectural critic has pointed out the strong likeness between the tower of Sompting and those of St. Castor at Coblenz. How then comes this likeness? Simply because all three are vestiges of the one primitive Romanesque, common to all these countries before the distinctive local forms of Norman and Aquitanian Romanesque were developed.

Now I know that I shall here be met with an objection which is, in truth, nothing better than a fallacy. I shall be told that all these German and Italian buildings are of much later date than is commonly thought, that they are of the twelfth century, or, at the earliest, of the eleventh, that they can therefore prove nothing as to any common primitive style; that any notions about Bishop Wilfrith or anybody else reproducing Italian towers or style in the seventh or eighth centuries must be the merest dream. Now I will not dispute about the dates of particular buildings; we have not time for it this evening, and I have not the materials at hand for such a controversy. Let us grant then that the great mass of the existing Italian and German buildings date, like the mass of those of England and France, from the eleventh and twelfth centuries. By admitting this, our position is in no way shaken. We must remember the difference between style and mere date; we must remember that an enlarged study of architecture is not satisfied with fixing with antiquarian precision the exact year in which such a church or castle was built, but it goes on to deduce from those antiquarian facts the true history of the building art. Let us grant, if any one pleases, that all the existing remains, Italian, English, or German, are all of them as late as the eleventh century, and our case would stand very nearly where it stood before. The resemblance between the Italian and the English buildings is far too close to be merely accidental, and it is a resemblance which cannot possibly have begun in the eleventh century. It has been shown by evidence that the primitive towers at Lincoln are later than the Norman Conquest,* and this fact, strange to say, has been brought forward to prove that there was no such thing as an independent English style before the Conquest. Of course what it proves is the exact contrary; no more convincing argument could have been asked for to prove the existence of such an independent style. These Lincoln towers are not Norman; they are, in their very form and outline, a protest against Norman innovations; but still less are they the first-fruits of an imitation of Italian models. They are evidently the last efforts of a decaying style, a style banished from minsters and palaces to obscure parish churches, and which even there the Norman influence was beginning to overtake. They would of themselves be almost enough to show that the days when England borrowed its models directly from Italy were then long past. The dates of particular Italian and English buildings do not affect the question. Granting that they are all as late as any one chooses to put them, the mere fact of their connexion, which is too clear to be denied, shows that they are, in both countries, only the representatives of earlier buildings of the same class. The original models were Italian, but the style took root in England, and got developed or corrupted for itself, while in Italy also it grew after a somewhat different fashion. Granting, for argument's sake, that there is no tower in either country of an earlier date than the eleventh century, the fact, if fact it be, in no way proves that English architects of the seventh or eighth centuries did not imitate contemporary Italian models, nor that the existing towers of England and Italy are not respectively later representatives of the buildings which set and followed the model in those earlier times.

---

* I mean not only the pillars of the crypt, but the large strange pillars, which have been moved from their places and are now kept under the tower.

† Vitæ xxiii Abbatum, pp. 40, 49 (Wats). The oddness of the story is rather in favour of its authenticity, cf. Buckler's St. Albans, 128, 134.

‡ History of Architecture, p. 189, 212.

This sort of reasoning, indeed, is one which has introduced confusion into more points than one in architectural history. It is found out that certain specimens of a class are later than has commonly been thought. A discovery of this kind is a good service to truth, as popular belief always tends to make things out to be older than they really are. But the discoverer sometimes leaps to the conclusion that, because some specimens are later than has been commonly thought, therefore the whole class must be later. Now all that his discovery really entitles him to say is that a certain custom was kept on later than has generally been thought; he has proved nothing at all as to the time of its origin. Take for instance the Irish round towers. It was a great advance to set them free from all the ridiculous speculations which had been poured forth about them, and to show that, to whatever incidental uses they may have been put, their origin is Christian, and their primary use that of bell-towers. It was another great step to show how late the custom of building this kind of tower prevailed in Ireland, to show that some of them are as late as the twelfth, and I believe even the thirteenth, century. But this last discovery will not justify any one in placing the round towers, as a class, at any such late date. Because a highly finished round tower, which must have had many ruder forerunners, is rightly placed in the twelfth century, it does not follow that one of those ruder forerunners may not be equally rightly placed in the seventh century. Giraldus, writing at the end of the twelfth century, speaks of the round towers in language evidently implying that the building of such towers was an ancient national custom which had prevailed for ages.* Now his language is in no way inconsistent with the belief that some of the round towers are of his own age, or even of a later age, but it distinctly proves that there were also round towers belonging to an age far earlier. So with another curious, but much less known, class of towers, the military church towers of South Wales. From their general air and character, any one would, at the first glance, set them down as of early date, not later perhaps than the thirteenth century. But a little examination of their details easily shows that most of them are of quite late date, some perhaps even of the sixteenth century. But it would be a great mistake to set down the type, as a type, as one of late origin. Though the mass of the existing examples are actually late, yet here and there we find early examples of the same general character, quite enough to show that the type is essentially an early one, and that the late examples simply prove that a form which suited the ideas and the habits of the districts remained in use for some centuries with little material change. These two cases, of the Irish and of the Welsh towers, thus clearly illustrate my position, that buildings of a later date may preserve and represent to us the architecture of a much earlier period, even granting, what I am by no means inclined to admit, that no actual examples of that earlier period remain. And I believe that both the Irish and the Welsh towers are connected with our subject by a closer tie than that of analogy. The Welsh towers, especially the earlier ones, often recall the general effect of the primitive English type; I suspect that they are in fact an adaptation of it to the particular purpose which they were meant to serve, that is, to provide a building which should serve at once as a bell-tower and as a fortress. And notwithstanding the peculiarity of the shape of the Irish towers, yet, tall, high, unbuttressed, commonly detached, as they are, there is a certain kindred feeling between them and the other classes of which I have been speaking, whether in England, Italy, or anywhere else.

---

* Parker's edition of Rickman, p. 103.

I have thus set forth my general position, and I have endeavoured to avoid misconception by pointing out certain questions with which it is, and certain others with which it is not, connected. I now come, rather late as it seems, to my main subject, the light thrown on the probable existence of such a common primitive Romanesque as I suppose by the buildings which I have lately visited in Switzerland and elsewhere.

I will begin with a building which, I think, almost proves my point, that most stately tower of the minster at Schaffhausen. A large church of the eleventh century, of the sternest and plainest Romanesque, is finished with a single side tower near the east end, which it is impossible to look at without at once feeling its close connexion with the Italian campaniles on the one side and with our own primitive towers on the other. Any one familiar with that class of towers in England of which Earls Barton is the grandest specimen will at once feel that here is the realization of the idea which such a tower as Earls Barton aims at. Schaffhausen is, in a comparatively finished shape, what Earls Barton makes a rude attempt at being. One cannot doubt that the tower of Schaffhausen shows us what our Anglo-Saxon towers might have grown into, if the style had been allowed free and full development, perhaps what they actually did grow into in those greater cathedrals and abbeys of which the Norman rebuilders have swept away all traces. The resemblance is less in detail than in general feeling; Schaffhausen has nothing of the "stone-carpentry" of Earls Barton; much of its detail might be Norman, but the tower, as a tower, is utterly unlike any Norman design. And yet in one most important detail this Swabian tower approaches closely to the primitive towers of England. I mean in the *mid-wall* shafts of the belfry windows, one of the features most characteristic of the "Anglo-Saxon" type of tower, and one of those which are most indisputably borrowed from an Italian source. The balusters of Earls Barton, an English feature which, as St. Albans and Tewkesbury show, survived the Conquest, appear also at Schaffhausen, but they are not extensively employed, and they appear only in a very mitigated form. They are clearly not a necessary feature of the style; if not a mere piece of "stone-carpentry," they are such a bungling imitation of the classical entasis that they are not likely to be found except at a distance from the original models. Even in England they are by no means universal; for instance, they do not appear in the primitive towers of Lincoln. But if there be a primitive Romanesque style, the mid-wall shaft is undoubtedly one of the surest features of it. We find it in places at a great distance from one another, and in a great variety of forms and uses, the peculiar type familiar to us in England being of course only a very rude shape of it. Its origin is doubtless to be found in the shaft supporting the entablature, the arch again resting on that. It thus easily runs into another form, the coupled shafts so common in the Aquitanian cloisters, and indeed in cloisters elsewhere, and in whose fully developed form it is easy to recognize a Saracenic influence. The midwall shafts at Schaffhausen, which are seen, not only in the belfry windows, but in the cloister and in some other parts of the monastic buildings, assume various shapes, some single, some coupled, but all having a family likeness, and all reminding an English antiquary of much that he is used to at home.

---

* Giraldus tells the story of the city which was swallowed by a lake, and adds, "Hujus autem eventûs argumentum non est improbabile, quod piscatores aquæ illius *turres ecclesiasticas, quas more patriæ arctæ sunt et altæ necnon et rotundæ*, sub undis manifestè sereno tempore conspiciunt."—Topographia Hiberniæ, ii. 9. There could not be a better description of an Irish round tower, and the passage most conveniently upsets two opposite errors at once.

The upper part of this tower, that is the gables and the spire, is evidently modern, or has at least been greatly tampered with, so I cannot warrant it as giving the original finish with absolute certainty. But it is probable that it fairly represents its general effect, one shared with it by a great number of German towers. It is in fact the form which we all know so well at Sompting, and which is also well known as a genuine German form, so modified as to take away a good deal of its excessive and perhaps unpleasing heaviness.

I assume the connexion of this tower both with the Italian and the English towers as something too palpable to be disputed. But I wish specially to point out the way in which this type of tower influenced German architecture long after the Romanesque style had altogether died out. The tall, hard, square, unbuttressed tower remained common for ages after every detail had utterly changed. I select out of many the tower of St. Stephen's church at Constanz. The general effect of this tower is singularly like that of Schaffhausen with some increase of lightness. But no part of it can be earlier than the thirteenth century, and the upper part—though the finish has been tampered with here also—exhibits a rather rich form of fully developed Gothic.

Now with this let us compare two other towers, both in the canton of Wallis, at the other end of Switzerland from Schaffhausen. These are the towers of the Abbey of St. Maurice and of the lower Cathedral of Sion or Sitten. In looking at these we at once recognize a certain analogy to Schaffhausen and its congeners, but the resemblance is fainter, the difference from ordinary Romanesque is much less marked. Still, I think, both their outline and their details justify us in looking on them as examples of our primitive style, though of the primitive style dying away and being gradually supplanted by other forms. The details of these towers differ less from ordinary Romanesque than those at Schaffhausen, and the pilaster buttresses at once remind us of the familiar Norman of our own country. Still we feel that they differ essentially from any Norman tower, and that, in every point of difference, they approximate to the so-called "Anglo-Saxon" type. The work at St. Maurice is ruder, and probably earlier, than that at Sion,* but both have the midwall shaft, or something having the same effect; the windows of both are quite different from any Norman windows. The height, too, and the position, both single western towers of large towers, have far more in common with the primitive than with the Norman type. They are palpable descendants of the campanile, and not of the cupola. The campanile, originally detached, is at Schaffhausen semi-detached; it does join on to the church, and yet it stands almost distinct from it. At Sion and St. Maurice, as in our own churches, it has taken up its common English position at the west end.

---

* Roman shafts and other fragments are used up again in a very singular way.

I do not know of any evidence for the date of the tower at Sion. For that of St. Maurice, M. Blavignac, whose work,* though most dangerous as a guide, still preserves a good many useful dates and facts, gives 1014 as the date when the church was re-built by the last Rudolf, King of Burgundy, after the deliverance of the country from the Saracens. But the famous Peter of Savoy in the thirteenth century is also said to have re-built or done something to the tower. No one can suppose that he built the tower itself; what he did was doubtless to add the spire, such as it is. And this reminds me of a curious fact, though not immediately connected with my subject. The cantons of Vaud and Wallis are full of broach-spires, making one almost fancy oneself in Northamptonshire. Count Peter plays an important part in English as well as in Savoyard history. Had he any hand in these spires, and are they due to any employment of English architects, or to any imitation of English forms ?

These three towers are all of them attached to churches of considerable size, and they exhibit the type in a degree of finish quite unknown in England. It is well that I am able to quote another, very small and unornamented, which forms as necessary a link in the chain as any of them. This is the little church of All Saints at Sion, about half way up the hill of Valeria, the rocky height crowned by the elder cathedral. The tower, a side tower, tall, thin, unbuttressed, covered with a low stone roof, with most distinct mid-wall shafts to its windows, must be felt by every one to be an example of the primitive style, nearly allied to the examples in our own country. But the general effect of the church calls to mind not an English but an Irish building. No one who has been at Cashel will fail to recognize in this little church a plainer and ruder congener of Cormacs chapel, the original cathedral on that rock which suggests so unavoidable a parallel to Valeria. Cormacs chapel, built in 1134, is very rich, and, in mere style, is Norman; this church at Sion, probably much earlier,† is very plain; it has Norman-like pilasters, but the windows have the double splay like our "Anglo-Saxon" examples. But All Saints at Sion and Cormacs chapel at Cashel have much in common, notwithstanding their wide difference in point of ornament. Had All Saints a second tower on the other side—a grouping much more common in Switzerland than in England—the outline of the two would be the same, except that Cormac has a more distinctly marked choir. As it is, they agree in one most extraordinary feature. Instead of an apse, in a position where even an Irish architect might have been expected to put one, a small square projection at the east end contains the altar. At Sion, where the east end of the church overhangs part of the rock, this projection is corbelled off, producing as strange an effect as may be.

I do not suppose that this little church was ever the cathedral of Sion, because no doubt the principal church always occupied the top of the hill, and because a small part of the actual upper cathedral appears to be of extremely early date. Otherwise it reminds one of that class of buildings of which Cormac's chapel is simply the chief, namely those early churches which in Ireland and Scotland seem to have formed the original cathedrals, and which sometimes remain side by side with the later and larger churches which have supplanted them. Such is the church of St. Regulus at St. Andrews, still standing beside the ruined metropolitan church of Scotland, and such seems to have been the church out of which by successive additions and changes, grew the present cathedral of Dunblane. Unluckily I have no drawing of either; I saw St. Regulus when it was too cold to draw anything; but I remember that the tower struck me as kindred with the Anglo-Saxon towers of England. Dunblane I drew and described at length; but I sent my description and drawings to the Meeting of the Archæological Institute at Edinburgh; there I presume that some cateran from the hills pounced upon them, as I never saw them again.

---

* Histoire de l'Architecture Sacrée du quatrième au dixième Siècles dans les Anciens Evêchés de Genève, Lausanne, et Sion. Paris, 1853.

† I have no evidence for the date of this church. Father Furrer, the venerable historian of the Canton of Wallis, whose acquaintance I had the honour of making when at Sion, told me, to my utter amazement, that it was built in the fourteenth century. To prove this he showed me a charter of a certain Count of Biandrate, who endows a chantry in this church, which his father, "aut construxit aut ædificavit aut *ædificare intendit.*" It is clear that this intention of rebuilding was given up; but the west door seems to have been then inserted, and much may have been done in the way of furniture and the like.

Now somebody will perhaps say that the points in which these towers agree are simply Swiss local peculiarities, that their resemblance to English buildings is accidental or imaginary, or, any one who is inclined to be imaginative may attribute the connexion to the agency of English and Irish missionaries, St. Gall, St. Columban, St. Boniface, and their followers. But I must remind you that, when these towers were built, there was no such country as Switzerland. Schaffhausen and St. Maurice are a good way apart, and still speak different languages. But when these towers were probably built, they were parts of two utterly distinct kingdoms, Schaffhausen of Germany, St. Maurice of Burgundy. Even if anybody chooses to place the towers after the union of the German and Burgundian crowns, though both cities would acknowledge the Emperor as their over-lord, they would still be under different immediate governments, and their inhabitants would be practically as much foreigners to one another as to Englishmen or Castilians. Again, the likeness between the Swabian and the Burgundian tower is by no means so clearly marked as the likeness between either of them and their English fellows. Surely such a likeness is not the result either of accident or of direct derivation, but the result of a common origin, of an independent derivation from models common to all. And my case will become stronger when I point out another group of towers in a part of the world far away from all that I have mentioned, presenting the same essential features as those of which I have spoken in England, Burgundy, and Swabia. Such a group may be found in the heart of the Pyrenees, in the neighbourhood of Bagnères de Luchon. The chief of these is the church of St. Aventin, one of the most remarkable buildings I know, and one which evidently set the fashion for its smaller neighbours. It is a nearly untouched Romanesque building, very plain, and apparently early. But I can only guess at its date from the following fact. A splendid doorway, such as in England would be of the twelfth century, and which, even in Aquitaine, we can hardly put earlier than the latter part of the eleventh, is a manifest insertion in earlier work. The church has two towers, western and central; both have distinct mid-wall shafts; both—even the central tower, so far as a central tower can—have the same hard, square outline as the others of which I have been speaking. Some of the minutest details, both in this and in other neighbouring churches, have the most singular likeness to details at St. Maurice, while in other points we can, as we should expect, recognize an independent local character. The type of St. Aventin, especially in the mid-wall shafts, is followed in several of the neighbouring village churches, and in the more distant tower of Arreau. As far as I could see, it is not spread over any large part of Aquitaine, but it is dangerous to speak positively on such a point, as it is naturally in obscure and out-of-the-way places that we are most likely to meet with examples of the primitive style of which I speak.

I have mentioned this group of Pyrenæan churches to show in what distant corners we meet with examples of this style, and how close is the resemblance between them. It is impossible to believe that

English, Swabian, Burgundian, and Aquitanian architects borrowed from one another. The long connexion between England and Aquitaine will prove nothing, because it did not begin till the second half of the twelfth century, when the later forms of Romanesque were fully established in both countries. Architectural fragments of this sort may be likened to the isolated fragments of nations which we come across in ethnological studies. These traces here and there of an earlier style which once overspread all Western Europe are analogous to those traces of an ante-Aryan race which scientific men discover in the same sort of solitary groups in various corners of the European continent. No explanation can satisfactorily account for either, except that both are fragments of something which, in remote times, stretched over the whole intervening space.

I have hitherto spoken mainly of towers, because it is in the towers that the characteristics of the primitive Romanesque, and the likeness between the examples of the style in very remote countries, are both most strongly marked. Of Romanesque towers not belonging to the primitive style I noticed but few. There is one at the small church of St. Mary, near the minster at Freiburg, where the windows are of ordinary later Romanesque, quite different from the mid-wall shafts of our other examples. But, though towers are the features which supply our best evidence, I must not wholly omit all mention of the other parts of the churches. I say the churches, because of civil and military architecture my subject allows me but little to say. I think however that part of the Bishop's Palace at Chur, to which a very early date is assigned, may be fairly set down as an example of our style. If my memory does not fail me, there are also windows with mid-wall shafts in the building called John of Gaunt's stable at Lincoln, a building which, I believe, does not owe its name to the renowned Duke of Lancaster, but to a much earlier family of the name of Gaunt.* If this be so, this house at Lincoln would be one of the latest examples of the primitive style, being no doubt contemporary with many fully developed Norman buildings.

But I must return to Swabian and Burgundian churches. Am I justified in setting down a tendency to omit the apse as a characteristic of our primitive style? No doubt many, probably most, churches of that date had the apse; the remarkable thing is that any should be without it. Now I need not say that, while the presence of the apse is, though not the invariable rule, yet most certainly the rule, in Continental architecture, its absence is even more thoroughly the rule in British architecture. The apse is rare in England, and, as far as I know, absolutely unknown in Ireland. This rarity or absence of the apse in the British isles has been attributed to an early primitive tradition, handed down from what we may call ante-basilican times. In the Norman period the insular tradition partly gave way; the large churches were commonly apsidal, while the apse was commonly absent from the smaller ones. But afterwards the tradition re-asserted itself, and brought about that singular peculiarity of our national architecture, the absence of apses from a large majority of our Gothic minsters. Now it is certainly remarkable that several of the churches of which I am now speaking are also without apses. I thought last year that it was a Swabian peculiarity, and certainly most of my instances are Swabian; but it cannot be exclusively Swabian, as we have already had a Burgundian instance in the church of All Saints at Sion. Now this very same square recess for the high altar, so strange a substitute for an apse, which we have seen at Cashel and at Sion, is found also, of course in an enlarged form, in the Cathedral of Chur, a church which, as being of decidedly transitional character, cannot be earlier than the latter half of the twelfth century. The apse again is absent at Schaffhausen; I am not absolutely certain that it ever existed at Romainmotier; it is absent from the two minsters at Zürich, buildings of later Romanesque date, and even from some fully developed Gothic churches like Romont. Undoubtedly, as I shall presently have to mention, the apse is found in several very remarkable churches, which we may certainly set down as examples of the primitive style. But the wonder is, not that it should be found in some examples, but that it should be absent from any.

---

* See Matthew Paris, a. 1241, p. 572 (Wats). The site of the minster was bought of "M. de Gaunt," a follower of the Conqueror, doubtless a Fleming by birth.

I have mentioned Romainmotier. Of this church and Schaffhausen I must speak a little more at length, as exhibiting early Romanesque work in two different forms, and possibly at two distant dates. Romainmotier is one of the most extraordinary churches in Christendom. I must have some better authority than M. Blavignac[*] for assigning the existing building to the year 753; still I may say that the eighth century is a more likely date than any date afterwards, till late in the tenth. One may imagine art advancing under the rule of Pippin and the Great Charles; we can imagine it again advancing under the great Emperors who reigned from the first Otto onwards; we can hardly fancy it making any great strides in the time which intervened between them. Constant shiftings and divisions of the Empire and its attached kingdoms, constant invasions of Northmen, Saracens, and Hungarians, produced much the same effect in Germany, Italy, and Gaul, as the Danish invasions did in our own island. We may well believe that in England the quite early buildings, those for instance which were reared by Wilfrith and Benedict Biscop[†] in direct imitation of Roman models, surpassed anything which followed them down to the days of Cnut, or at any rate to those of Eadgar. Thus, though I by no means accept the early date of Romainmotier till I have more distinct evidence set before me, I by no means cast it aside as something absurd in itself. The church, whatever its exact age, is worthy of most attentive study, as we perhaps nowhere find so large an example of early Romanesque so little altered; and it is the more remarkable because there is Romanesque work of two palpably different dates—one blocking up the other—though it is not easy to make out any difference in style between them. The church is a cross church of the ordinary plan, with a central tower, to which is added a very large chapel, or whatever it is to be called, to the west of the nave, reminding us of the western additions to St. Woolos at Newport in Monmouthshire and to Llantwit Major in Glamorgan. Looked at as a church of the primitive style, the most remarkable thing about it is its having only a single central tower, of the massive proportions of those towers which are the natural successors of the central cupola. St. Aventin, it will be remembered, has a central tower, but it has also a western tower, of something like the usual proportion. I think no one who looks at the outside of Romainmotier can doubt that we have here a genuine example of a primitive Romanesque minster, the sort of ideal which such a church as Stanton Lacy would have realized if it could. The inside may be more doubtful; yet, unless we resort to some very improbable conjectures, we shall be led to believe that the greater part of the building—allowing of course for some palpable additions and alterations—belongs to the early date. The western chapel, which must be a little later in actual age, looks the earliest—that is to say, it is the plainest; but, as I before said, I am by no means convinced that greater plainness is necessarily a sign of greater antiquity. In the western chapel the piers are quite plain and square; in the nave they are round with square abaci, the angles being cut off in a rude way. In the eastern limb is one of the strangest piers I ever saw; a thin rectangular pier, almost reminding one of some of our mullion-shaped Perpendicular pillars, with a half-column, as it were, squeezed up against it. The capital of the half-column is a rude attempt at rich, perhaps Corinthian, foliage.

Romainmotier then is specially valuable as showing us what the interior of a large early

---

[*] Page 78.

[†] "Benedictus, oceano transmisso, Gallias petens, cæmentarios qui *lapideam* sibi ecclesiam *juxta Romanorum, quem semper amabat, morem* facerent, postulavit, accepit, attulit."—Beda vita Bened. 5. So Gervase (X Scriptt. 1299) speaks of the old church of Canterbury as "opere Romanorum constructam."

Romanesque church was. This is the branch of the subject on which our examples, especially our English examples, afford us the least information. I think we may fairly take the external ornaments of Romainmotier as fixing its primitive character; if the interior proves that the earlier Romanesque differed less from the later in internal than it did in external work, there is surely no difficulty in so believing.

The piers in the nave of Romainmotier are not so heavy as many of those to which we are accustomed in England; still they go beyond the thickness of anything which can fairly be called columnar. But at Schaffhausen the greater part of the nave—the rest of the church being perfectly square and plain—has columnar piers with a palpable diminution and some attempt at an entasis. The capital is a plain cushion, an advance on the rude attempt at cutting off the angles at Romainmotier. Something like this, but much more massive, may be seen in the crypt of the palace chapel at Chur. The nave of Constanz Minster has been so greatly tampered with that it is hard to know how far one can trust anything; still, with the Schaffhausen example before our eyes, it seems possible that the columnar piers, with a still more distinct entasis and a multiplied cushion capital, may be genuine. In the crypt of the same cathedral are some undoubtedly genuine early shafts of various shapes. In one there seems to be the rudest attempt possible at the cushion capital; while another column, with the rudest possible base, has a capital covered with rather elaborate foliage. This was doubtless cut out afterwards, but I know no reason why these plain capitals, both here and at Westminster, may not have been from the beginning designed to be cut out. The only view which forbids the belief is the theory that the chisel was not in use till late in the twelfth century, and this theory, as we have seen, falls to pieces as soon as we attentively consider the passage of Gervase on which it professes to be founded.

The Abbey church of St. Maurice has been almost wholly re-built in the modern Italian style, but it is said that the piers, though not the arches which they carry, are part of the original Romanesque building. I thought that the piers themselves, plain round columns, were genuine, but I doubted about their quasi-Doric capitals. I do not however decidedly pronounce against them.

I must end with a few examples in which we get the primitive style brought into contrast with more ordinary Romanesque, with the style contemporary with, and answering to, our Norman. If I am right in my theory, architecture everywhere took a great stride in the eleventh century, Men began at once to strike out new paths for themselves and to imitate classical models with more precision. I hold the primitive style to have been an importation from Italy, after Italian architecture had developed for itself a character distinct from the earlier classical models. The later Romanesque, so far as it imitates at all, falls back upon the classical models themselves. Of course it did this in very different degrees, according to the number and merit of the Roman Remains in the country. France—even Normandy—is more classical than England, and Aquitaine is more classical than France. Again, it strikes me that, while in England at least the later Romanesque violently supplanted the earlier, in more Southern countries it was, to a certain extent, developed out of it. We have seen something like this in the towers of Sion and St. Maurice, and I may remark that the double splay, so characteristic with us of the earlier style, is in this country often continued in the later. It follows from all this that the style which, in countries like Aquitaine and Burgundy, answers to our Norman, is very much more classical than our Norman. Examples of this style I see in the church at Grandson, and in the Romanesque parts of the minster at Neufchâtel. M. Blavignac * refers Grandson to the time of Charles the Great. I see nothing distinctively primitive about it. The plain square portions may indeed be of any date, as early as Romainmotier or as late as the Great Minster at Zürich. But though the columns of the nave

---

* P. 122. Because Charles the Great used up Roman columns in his buildings, it does not follow that later people did not do so also.

are doubtless, as M. Blavignac says, Roman columns used up again, their capitals are assuredly not earlier than the twelfth century or the very end of the eleventh. So at Neufchâtel and other places, where M. Blavignac sees work of the tenth century, I can see only advanced Romanesque, sometimes actually Transitional, work of the twelfth. Now in the two small churches of St. Sulpice, near Lausanne, and St. Peter, near Sion, we find the primitive style, very plain and simple, brought into close juxtaposition with later Romanesque, the upper part of the tower in both cases having been added or rebuilt after the later fashion. The churches are small domical * buildings, much like many of those in Aquitaine, the cupola being covered at St. Sulpice by a square, and at St. Peter's by an octagonal, tower. The upper stages of both are later, marked clearly by the masonry as well as by the details. Those details are well worth studying, as showing how the later Burgundian work differs alike from our own Norman and from the primitive style of the country. The interiors of both churches are quite plain and square, except that one pier at St. Peter's assumes for about half its height—the lower part being square—the genuine form of the massive round English pier.

I have now said pretty well all that I have to say both on particular buildings and on the general question which I wish to start. Doubtless I could describe and comment on this and that church at infinitely greater detail, but I did not look upon that as being my province this evening. As for the general question, I leave it in the hands of my hearers. Thoroughly to test it, as I trust some one will test it, would require a much greater knowledge than I possess of the buildings of Germany and Italy, and of that large portion of Gaul which lies between the Canton of Vaud and the buildings which I mentioned in the Pyrenees. Remember I am only starting questions, not putting forth dogmas *ex cathedrâ*. Whether I am right or wrong, I am sure that the questions which I propose will be found deeply interesting, and that much curious and valuable knowledge will be found out in the course of their investigation. I will only add, or rather repeat, two cautions. As I am dissatisfied with the early dates of M. Blavignac, I am also aware that there are antiquaries who would look upon many of my dates as also too early. But as I before said, if all my examples are shown to be of the twelfth century, my case is not disproved. The styles are different, and to prove that Earls Barton and Romainmotier were of the twelfth century would only show that the two varieties of Romanesque coexisted side by side longer than I had thought that they did. Again, I trust that examples of the primitive style will be found in various other parts of Western Europe; such buildings as the Abbey Gate at Lorsch, which I have not seen, and the Temple of St. John at Poitiers, of which my drawings are too imperfect to enable me to speak with much certainty as to its details, will, I hope, be proved to belong to it. But should it be shown that the style is confined to the two or three corners of Europe where I have observed it, nothing will thereby be proved against the general existence of the style at an earlier date. England cannot have been in league with remote corners of Burgundy, Swabia and Aquitaine, to produce tall unbuttressed towers with mid-wall shafts. The resemblance cannot be accidental; it cannot be the result of direct imitation; no explanation, as it strikes me, can possibly account for the phænomenon, except to look on all as independent offshoots from one common stock.

The CHAIRMAN, Mr. G. E. STREET, Vice President, said he was sure they all felt greatly indebted to Mr. Freeman for the paper he had given them, and he hoped it would elicit some remarks from those present. It was a great privilege to an Institute, consisting for the most part of professional men, that occasionally persons not strictly professional should give them the benefit of their scientific inquiries and researches into the history of architecture, and lay before them information on subjects which most of them had not the time or opportunity to inquire into for themselves. They therefore owed their thanks to Mr. Freeman, though perhaps he ought hardly to speak of him as an amateur, but rather as one who though he devoted himself chiefly to another branch of study, had nevertheless placed before them a vast amount of information on a subject of great interest to them all. And as they were favoured with the presence of another distinguished writer on architecture, who had given them much valuable information on the subject of the early architecture of Germany, before saying anything on Mr. Freeman's paper, he would ask the Master of Trinity to oblige them with some observations upon it.

---

* St. Peter has a genuine cupola, and St. Sulpice something which, by a little stretch, may be called one.

Dr. WHEWELL, Hon. Member, in answer to an invitation from the Chairman, said he had had his attention drawn to the subject of the formation of the styles of architecture in Europe many years ago, but he had long felt that what was known then was only a very small beginning of what was known now by every person in the room, and therefore it was not for him to attempt to offer any fresh ideas on the subject. He had listened with interest to the remarks in the paper as to the connection of English architecture with Italian. When he first visited Italy he was struck with the character of the Italian steeples and towers noticed this evening. It was a very curious question how far these were connected with our Norman or *Saxon* architecture, as we then understood it. The notices that had been given of the probable derivation of the English examples from the Italian required a great deal of development, and there was a great deal which was novel to him in the statements made in the paper just read. He could perhaps best make the members understand the point of view in which they regarded the subject, by taking them back to a very ancient mode of denoting it:—What was now called Norman, was called Saxon fifty years ago; and it was only after some years—though the time was nearly forgotten—it was made out by antiquarian research that there was scarcely any building of note which could be proved to be anterior to the Conquest in England, and when this had been established, a few persons acquainted with the subject, such as Mr. Petrie, Mr. Blore, Mr. Rickman, and others, pointed out that there were certain buildings—the church of Earls Barton, and others of that kind—which must be considered, if anything could be so considered, as anterior to the Norman buildings, because they seemed to have peculiarity enough to make a style; and had beyond doubt internal evidences that they were anterior to the buildings of Norman features which accompanied them. They *seemed* to have peculiarities enough to make a style, but of that there was a doubt. The strange name given to this kind of building, as it might seem to the younger members of the profession—*long-and-short* masonry—showed how difficult it was to seize the peculiarities which marked the style; but the name "long-and-short" arose from this—that in place of having the quoins at the angles of the building, with the projection alternately on the faces;—for instance at the north-east angle alternately on the east face and the north face—these buildings had alternately, down the angle, long stones vertical and short stones horizontal. That was one of the features at Earls Barton and other places. The stone carpentry was, as it had been just called, another peculiarity of these buildings; the mid-wall baluster was another. The question was whether these peculiarities were sufficient to make a style at all. They might entertain some question of that still, as there were not above a dozen of those buildings in England. One question was whether they did make a style; but whether these were derived from Italian buildings must be a doubtful matter. These were questions which had sometimes occupied the minds of amateurs like himself, and even now had hardly been quite solved; and all steps towards the solution of it contributed by persons having an intimate knowledge of foreign styles as well as English, and had studied the history of foreign as well as English architecture, were extremely valuable; and in that light he was sure the paper they had heard this evening must be regarded.

Mr. FERREY, Fellow, asked Mr. Freeman to explain how he applied the term Anglo-Saxon to any buildings erected in England subsequently to the Norman Conquest?

Mr. **Freeman** answered that, as he had said in his paper, the case was simply the usual one of all Transitions; the later buildings of the old style and the earlier buildings of the new style were contemporary. The event of William's victory did not at once cause a revolution in architecture; some buildings in the new style had been built before 1066, and some buildings in the old style were built after that year. If then those styles were to be called respectively "Anglo-Saxon" and "Norman," it followed that there were some "Norman" buildings earlier than the Conquest, and some "Anglo-Saxon" buildings later. The best illustration of his meaning would be found in the churches at Lincoln, which he had already spoken of. There are in the lower parts of that city certain towers, not quite free, it may be, from an infusion of Norman ideas, but still, on the whole, decidedly "Anglo-Saxon" rather than Norman. Any one would, previous to any historical information about them, set them down as some of the latest examples of "Anglo-Saxon" work, just before that style gave way to Norman. Now he found, on the authority of Mr. Parker—who however used the fact to prove one thing while he used it to prove another—that these towers were actually built after the Conquest. The English, or rather Danish, inhabitants of Lincoln were driven from the upper town, and formed a settlement at the foot of the hill, where they built these churches. Meanwhile the Norman castle and cathedral were rising on the acropolis above their heads. Here was a distinct case of the two styles being used side by side after the Conquest, the English builders continuing to build essentially in the old national way, though perhaps not without some slight influence from the fashionable foreign models. So at St. Alban's, as he had already mentioned, though the church was built by a foreign Abbot, and one who so despised his English predecessors that he turned them out of their graves, yet some distinct features of the earlier style could be seen, owing possibly to the accumulation of materials which Matthew Paris records to have been made by the later native Abbots. Here again is a case of "Anglo-Saxon" work after the Conquest, and doubtless other examples might be found, if we had more exact dates of the building of our smaller churches.

Mr. **Ferrey** mentioned that there was a curious little tower with balluster shafts in the belfry windows still existing at Wickham, near Newbury, which was clearly Romanesque.

Mr. **John P. Seddon**, Hon. Secretary, said it was an interesting question whether a style of *Romanesque* more directly founded upon the decayed classical Roman, had existed throughout Christendom at a considerably earlier date than those locally varied styles usually grouped under the name of *Romanesque*—such as the Norman, Lombard, German and French varieties. This point might doubtless be successfully investigated, and he hoped it would be so, by antiquaries such as his friend Mr. Freeman. The church at St. Castor at Coblentz, which had been referred to by Mr. Freeman, in itself an early and characteristic example of the more usual German Romanesque, exhibits a considerable portion of a much earlier building incorporated with it. This is evidently a direct but rude imitation of classical Roman work, without the freedom, vigour, and grotesque imagery of later Romanesque. It has pilaster strips as decoration intersected by string courses (not entablatures,) the moldings of details of which are simply debased Roman. The date to which this part of the building is referred is about the seventh century. The western doorway to the nave at the church of St. Woolos, Newport, Monmouthshire, has in each jamb a column evidently Romanesque, but not Norman, and yet not of the balluster description, but with foliaged capitals, molded bases and shafts, with an entasis resembling Roman. These would appear to belong to an earlier style than Norman, but of a superior class to what Anglo-Saxon has usually been considered.

The **Chairman** said if it would not be trespassing too much on the kindness of Mr. Freeman, he should like to ask him to give some explanation as to the roofing and plans of the churches he had described, for he held that interesting as their towers were, the system of roofing and the ground plans were of even greater importance in their history. As far as he gathered, and from what he knew of some of these churches, and from what he had heard this evening, he was inclined to think that the commonest type of ground plan in the early Swiss churches was that common plan of a cross church with one of three apses at the east end, and he was naturally curious to know what was the nature of the roofing of some of Mr. Freeman's examples. It was well known to those who had examined the churches in Aquitaine, in Auvergne, in the Pyrenees and throughout a great part of Spain—from Gerona on one side to Santiago on the other—that in all these districts there exist churches executed in the eleventh and twelfth centuries, which are roofed with a barrel vault over the central nave, and with two half barrel vaults over the aisles, whilst the eastern apses have semi-domes. He had no doubt that the earliest of these examples were of the eleventh century, and he was amazed to find the similiarly designed and constructed church of Granson, on the lake of Neufchatel, seriously described by M. Blavignac—himself an architect—as being a building of much earlier date, either of the ninth or tenth century—he forgot which—in which opinion he was followed by Mr. Fergusson in his "History of Architecture." It had always struck him as being an eleventh century church, and what Mr. Freeman had said about it confirmed him in this opinion. Another group of early churches like that of Schaffhausen seemed to have been roofed with wood, with the exception of the eastern apses, which were almost always covered with semi-domes. It was a remarkable feature in these early churches all over Europe, that whatever the roofing may have been, the Italian plan of three parallel aisles, a central lantern over the crossing, and parallel apses at the east end, was carried out so universally that they might take it as one of the great types of the time. Referring to the steeples described by Mr. Freeman, it seemed to him that in the churches of St. Maurice and Sion, the towers in fact belonged to two different styles, although they seem to have struck Mr. Freeman as being identical in style and feeling. [Mr. **Freeman**, Not quite]. That of St. Maurice seemed to him to be distinctly a Romanesque steeple of the previous kind, whilst that of Sion differed altogether from it in design, and following the example of the steeples in Lucca, there was a regular progression of openings in the tower, the lowest stage having one, the second two, the next three, and the fourth four windows. This type of steeple was repeated very far off, and he remembered one in the centre of Spain. The steeple of St. Maurice was very regularly divided into stages separated by corbel-tables, and with flat pilaster buttresses at the angles and in the centre of each side. He should be glad if Mr. Freeman would favour them with a few additional words upon the roofing and plan of these churches, with some explanation of his views as to the occurrence of the square east end. To him it had always seemed that one of Mr. Freeman's examples, the church at Romainmotier, had originally had three eastern apses, and he doubted much whether any example could be adduced for a choir and aisles with three square eastern end walls in this part of Europe. In conclusion, he would remind the meeting that these early churches often contained other features of interest beyond those which had been referred to, and to take one example, he remembered seeing in the old cathedral on Mount Valeria at Sion, a thirteenth century rood screen and loft between the nave and the choir, and a very good Gothic organ and case at the west end of the nave.

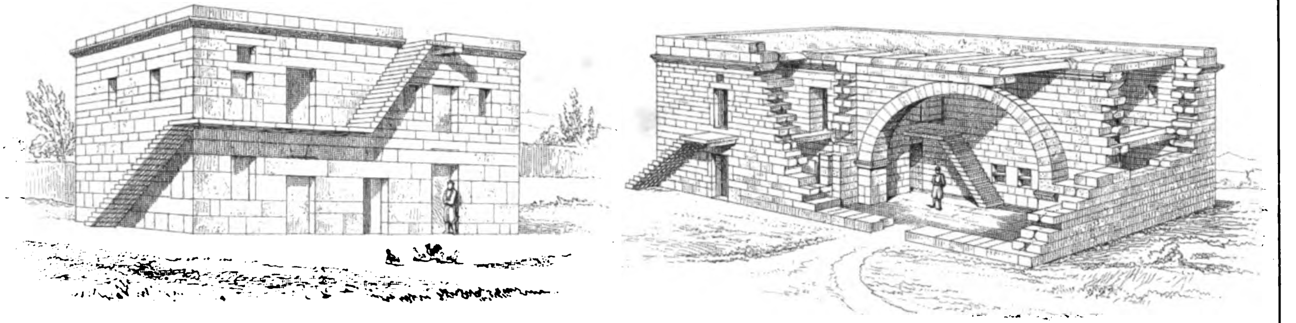
Mr. **Freeman** said he did not undertake to give a very minute antiquarian description of all the buildings which he mentioned. Some of them he had only seen in the intervals of other work, and in places where he wished to spend two or three days, he had often been able to stay only as many hours. He did not positively say that the Romainmotier had originally a square end: but the square end is as clearly found in some instances as the apse is in others. The east end of Schaffhausen is square; so are those of the two minsters at Zürich. [The **Chairman** believed Schaffhausen had no aisles. Mr. **Freeman**—Not quite to the east end.] With regard to the roofs, he imagined the Chairman referred to cases where there was vaulting; timber roofs he must confess were the last things which he ever thought of examining. St. Sulpice had a dome and a semi-dome over the apse. Grandson had a barrel vault, and other instances of that form were common in Aquitaine. Schaffhausen seemed to have had a flat roof like many of our Norman churches. At Romainmotier a later clerestory and vault had been added to the nave. To the central space of the western chapel he could say nothing, because it was cut up by floors. The aisles had a perfectly plain cross vaulting without groins or ribs. With regard to St. Maurice and Sion, it was only the towers which he had been talking about; the rest of the church in both cases was much later. The little chapel on the side of Valeria he thought had no vault. As far as the three great towers were concerned he was inclined to put Schaffhausen as the most distinctive of all, just like one of our Anglo-Saxon towers somewhat improved. At St. Maurice they had an approach to common Romanesque, while at Sion they had something still in advance of that. The three towers were certainly not identical; he looked on St. Maurice and Sion as examples of primitive Romanesque developing into something else, still retaining a good deal of the primitive style, but gradually changing in the later forms. Schaffhausen alone of these large towers showed the primitive type in full perfection. As he had stated in the outset of his paper he had merely put forth some hints for others to work out. He had not visited Switzerland directly for any antiquarian purposes, nor had he commonly directed his course with reference to antiquarian purpose. Romainmotier indeed he had gone to see directly for the sake of its church, but the other places he had visited on other business, and many of the examples which he had spoken of, he had come across almost by accident, and was very thankful so to have found them. His whole object was to throw out a theory, which he left others to accept or reject as further inquiries might lead them to do.

Mr. JOHN W. PAPWORTH, Fellow, said that the judicious manner in which Mr. Freeman had worded his case, must render the meeting indisposed to see any captious feeling in the single remark that he might offer upon the latter portion of the paper just read. It was, simply, that adding the original western towers of Lincoln cathedral, and the steeples at Caen, to the campanili at Ravenna and at Rome, suggested by Mr. Freeman as standards for a comparison, he was not inclined to give an immediate assent to the theory which Mr. Freeman had propounded. Such incredulity may be right or may be wrong, but it was instinctive on the present occasion, and it was always the difficulty attending a meeting of this nature that when Mr. Freeman presented such opinions, bearing the impress of such authority, it was scarcely possible for any person but one who had accompanied him in his journey and in the collection of his observations, as well as in the preparation of his deductions, to improvise a fair criticism, or to offer compliments which would not appear to acknowledge Mr. Freeman's conclusions as inevitable. The meeting clearly felt that its thanks were due to Mr. Freeman for the manner in which he had brought forward the points that he supported, and for the large fund of subject for consideration which he had given. Mr. Papworth wished to express his personal delight at the prefatory remarks in which Mr. Freeman had so well conveyed to young and old the lesson that to study art aright they must do so not only as artists, but as men who see in the works of their predecessors the character of the people of the age. He ventured to throw out for Mr. Freeman's consideration, when sparing further time to the subject, or when re-editing the valuable "History of Architecture," the possibility of the existence of a large quantity of buildings in all parts of Europe, (excepting of course those not christianized till a late period) which might suggest materials for a paper similar in its nature to that just read. Mr. Papworth's view was that *in each country*, when Roman power succumbed, Roman art left its seeds; and that these seeds, far from at once perishing as is generally assumed, produced plants which *ran back*, as a floriculturist would say. So that, taking England for example, there should have been left by the Romans a manner of building corresponding in all respects (except under influences of habits and prejudices of the people), with that executed under similar circumstances elsewhere; and perhaps this got worse by degrees, until the arrival of a new fashion, *whether from the north or the east.* The old and the new manners might be supposed to suffer of course a greater or less degree of deterioration in their transport. It would be desirable to ascertain the amount of influence on art exercised by artificers from Italy in England, and to *compare it with that which must be ascribed to British missionaries while founding their monasteries.* It should not be forgotten that as England at a later period accused the court of Edward the Confessor of being Norman, we might expect that his buildings would offer examples of any peculiarities of the artificers employed by the Norman dignitaries; while the patriots (as they would consider themselves,) would continue to build in the manner to which they had been accustomed. In return, the best authorities agree that afterwards English influence in some provinces of France was as evident in building as in war. Because art turned backwards and forwards in this manner over the face of the civilized world, it seemed difficult to permit belief in the idea of a central type, except at the periods of marked revolutions of style. An account of the reasons for these revolutions is one which should be strictly rendered, and which we have still to demand. He had the honour to propose their vote of thanks for the very able paper, which they should be ready to peruse deliberately, and to consider with interest, although deprived of the advantage of referring to the sketches as illustrations, or rather evidence in Mr. Freeman's favour.

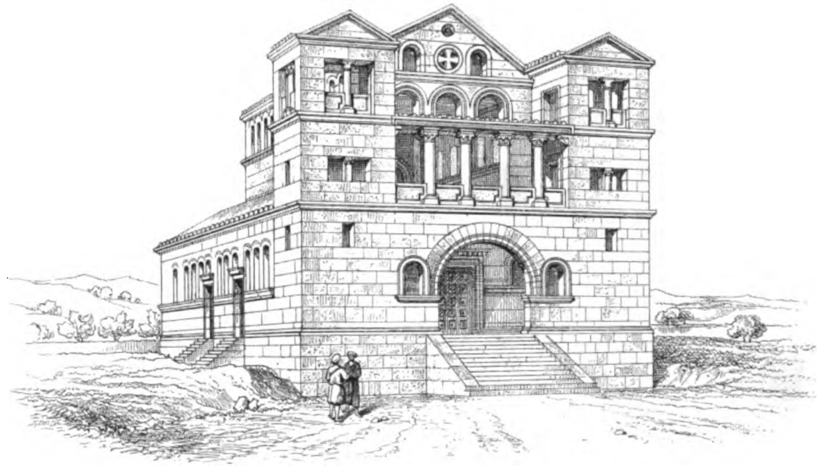
Mr. C. F. **Hayward**, Hon. Sec., said, having been much interested in the study of Romanesque Architecture in Germany, he had heard with great pleasure Mr. Freeman's remarks with regard to a district which he (Mr. Hayward) was not so well acquainted with. In one part of the district alluded to, particularly on the Lake of Constance and along the Rhine to Schaffhausen, Mr. Freeman had spoken of churches with the eastern ends built square. This was remarkable, for in making that journey himself, coming from the centre of Germany, the chief instances of Romanesque architecture he had met with, particularly that splendid example, Bamberg Cathedral, had numerous apsidal terminations at both ends, and often at the transepts also. So that at one time he almost thought that these apsides must have been a distinguishing feature of Romanesque architecture, derived directly from the tribunes of the Basilicas of Rome. But when they came to consider other varieties, and trace the style through some of its phases under the terms of Anglo-Saxon, Norman, &c. and considered how the local peculiarities affected its development in different parts of Europe, its importance as a study became apparent, and any contribution to that history ought to be received, as he was sure this paper would be by all, with great satisfaction and delight, illustrated as it was with such a variety of interesting sketches. He only hoped Mr. Freeman would carry out the enquiry further, for it seemed to him to have been greatly neglected, and many a church of plain exterior, with a few round arches to show in its elevations, had been passed over as not worth considering, in Germany and elsewhere, which would have repaid a large amount of research and trouble. In a paper read by himself before the Institute, in the year 1854, discussing the Romanesque style as developed in the churches on the Rhine, and at a little distance from that river, (the period of which he had ventured to term the "Pre-Gothic Age,") he had taken occasion to remark upon that most interesting Abbey Church called Kloster Laach, which, although about eight miles inland from Andernach, was well worth a visit, and if any present were not acquainted with it, he would recommend, when making an excursion in that direction, this and the other noble Romanesque examples of Andernach, Coblentz, Maintz, Worms, &c. &c. to their especial study.

The **Chairman** remarked, that as this was the last meeting of the Session, it was probable that many of the members, before they met again, would pay a visit to the Swiss mountains. He hoped they would not, at the same time, neglect to examine the churches which Mr. Freeman had brought under their notice.

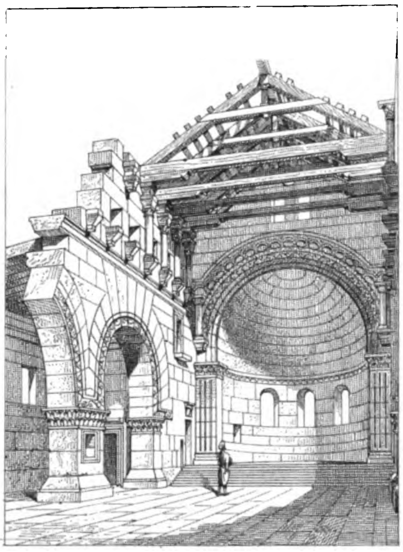
The proceedings of the Session then terminated.



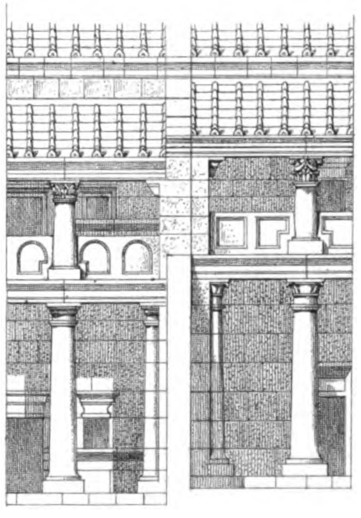
Private Houses in the Hauran. — Roman period.



Church of Tourmanin near Aleppo. — restored.



Church of Kalb-Louzeh, near Antioch.
VIth Century



Private Houses of Serdgilleh-Djebel-Riha.

M. de Vogüé

ILLUSTRATIONS TO THE ACCOUNT OF THE ANTIQUITIES IN THE HAURÁN AND ABOUT ALEPPO AND ANTIOCH,
BY PROFESSOR DONALDSON, PRESID^{T}

J.R Jobbins